FULL DENTURE PRACTICE

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BY

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To the Memory

of

A Christian Father and Mother

and the Enduring Fidelity of a Devoted Wife, this

Book is Affectionately

Dedicated.

PREFACE

Requests have come to the author from nearly every state in the Union for a text on Full Denture Technic as practiced by him. These requests began to come in more than five years ago and have increased to the point where one could not continue to ignore them. The first thought was for a book that would cover every phase of the subject. After carefully considering the matter, however, it was deemed unwise to write so large a volume as it would necessarily cover much subject-matter that has been so ably and completely covered by other writers.

In the field of Full Denture practice today the great need is for a standardized technic. The point has been made that the profession could not standardize its full denture procedures. This is true if it is meant to say that the profession will never come to a point where it will follow an iron-clad procedure step by step. This is not true when applied to each individual member of the profession. The dentist who will use one technic today and another one tomorrow, and next week resort to a combination of the two, all the while expecting the same end results in a given series of similar cases is doomed to disappointment. Such tactics will result in miserable failure. The individual, through his own experience and making use of the long experience of others, must decide upon a technic which he is to follow in his own practice, and then set about to perfect himself in the execution of that technic. This then becomes his technic and is possibly a combination of several others, all being equally effective in securing satisfactory end results.

A satisfactory denture technic must produce dentures that will function in enunciation and in mastication with

comfort to the patient. There are many conditions to be faced and solved if such an end result is to be attained. Whatever the technic used, the patient must not be allowed to wear the dentures until the occlusion has been balanced. There are several schools of thought as to how this should be accomplished, and yet individuals representing these several schools are producing equally satisfactory results for their patients. The answer is that these individuals have standardized a technic in their hands and are carefully following it in each and every case. It is not so much as to how they balance the case. It is the fact that the case is balanced before it is delivered. A denture margin cannot be extended to a point where it will interfere with the functional requirements of the border tissues if the denture is to be all that it should be. It is not absolutely necessary that every dentist follow the same technic in arriving at this result, but it is necessary that he arrive at this result, whatever the technic used.

The author has crowded into this small volume the results of twenty-five years' experience in denture practice. During these years much of this time has been spent in the schoolroom, the dissecting room and the college clinics. More than one hundred heads have been partially dissected in studying the anatomy with which we are concerned in denture practice. Valuable information has been gathered from other men and more than 2,000 practical cases have been constructed, using the technic herein described. The late Dr. B. K. Bowen was the first to really make an attempt to standardize the "wing denture." It was my privilege to take him to the dissecting rooms of Vanderbilt University where really began the serious matter of determining if such denture

procedure could be standardized. The first head dissected proved that Dr. Bowen was wrong in his attempt to carry the denture margin below the Mylo-Hyoid Ridge. It was, however, his persistence along this line that led to the discovery of the fact that there were areas above the level of this muscle which were available for the extension of the denture margin. It is unfortunate that men are sometimes so misunderstood that their real motives are never appreciated.

This volume is more or less limited to a discussion of those practical procedures which are the result of a quarter of a century of research and study by the author and which have proven of great value to him in his practice with the hope that the reader may find some truths that will enable him to so standardize his denture procedures as to make the road a bit smoother.

This opportunity is taken to express the deepest appreciation to a host of friends in and out of the profession for the fine spirit of co-operation in this work.

Most of these illustrations are original drawings by my son, Dr. J. B. Neil. His contribution to the book in this way has been a source of inspiration.

Ewell Neil, D.D.S.

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CHAPTER I

A complete survey and examination of all mouth conditions leading to a diagnosis and prognosis is an absolute prerequisite to success in Full Denture work. The end results in a given case cannot be the best possible when the operator has failed to study and take into account all of the physical conditions to be encountered as the work progresses. It is not enough to look into these physical conditions but one must also make a study of the patients' state of mind and classify them as to their mental attitude toward the problem of wearing dentures.

The following phases of mouth study must be considered:

Mental Classification
X-Ray findings
Arch Size
Arch Form
Ridge Form
Ridge Relations
Throat Form
Lateral Throat Form
Tissue Tone
Tissue Resiliency
Saliva Conditions
Tongue Conditions
Border Tissue Attachments
Condyle-Meniscus Conditions
Lip Ridge Relations.

Mental Classification

The patient's mental attitude may be classed under one of four possible groups, viz., Hysterical; Exacting or Hypercritical; Indifferent, and Philosophical.

The exacting mind is found most often in the woman who has lost her teeth at a time when she is very active in social life. It may be that she has lost her teeth early in life or it may be that she is past sixty and trying to remain at forty. She cannot afford to miss any social functions and she must have her artificial substitutes supplied at the earliest possible date and they must be so

perfect as to defy detection by her friends. She will possibly tell you that her teeth were small and white. The operator might tell her at this time that her hair was once black (if he has the nerve). She is expecting you to produce the last word in esthetics and yet she is insisting on bossing the job. She may be one of those individuals who had a short upper lip and an extreme tapering upper arch with long prominent teeth and yet she will insist that she never "showed her teeth much." She will insist that you do the impossible, viz., hide her teeth beneath this short lip. Such patients are unreasonable and will change their minds and their statements as often as a chameleon will change his color. Even though you have them properly classified and arrive at a definite understanding with them, you will have more than your share of grief with the case. One should never finish a case for such a patient until members of the family have come in and placed their O. K. on the color, mold, size, and arrangement of the teeth while they are in wax. If this is not done you may succeed in pleasing the patient but when they go home with the finished case some member of the family will make some criticism and then the patient returns dissatisfied and placing the blame on you. Even after the family has been pleased some friend will remark to the patient upon seeing them the first time after the new teeth are recived, "What on earth has happened to you?" Your only salvation in such cases is to get your check when the case is delivered.

The Hysterical Mind

This patient presents a very positive and predetermined opinion as to her lack of ability to wear artificial teeth although she has never tried. She will announce upon entering the office that she "knows she will never be

able to wear artificial teeth." It may be a woman who is passing the menopause and if this is the case she deserves your patient consideration. A storm is raging in her whole nervous system. This storm should be allowed to abate before making dentures. Advice to this effect to the husband if followed will save everyone concerned considerable trouble and expense.

Such a patient frequently returns the dentures, refusing to accept them and pay for them. At the suggestion of some friend or member of the family this patient may go to some other dentist who will possibly have the same experience with her. Over a period of several years or maybe a shorter time such a patient will have "made the rounds" and had sometimes as many as a dozen sets of teeth made, some of which were undoubtedly as good as was possible to produce in this case and yet none of them please her. During this time, however, she has acquired quite a bit of denture experience. Of course, such an one will never admit it, but they have certainly learned that it was not possible for the first man to produce for her everything she wanted. She also learned that the case built for her was possibly better than any of the subsequent ones. At least there was a difference. Such a patient will nearly always eventually come to a state of mind where they will wear dentures and quite often will wear a case far inferior to others which she has condemned. Then she will go around singing the praises of the man who "finally fit her" and doing a great injustice to several other very conscientious men who tried to render her a real service.

The Indifferent Mind

This mental type is usually found in the old lady or gentleman who has lost interest in social and business

affairs. They are now living with the married children and are satisfied to stay at home and play with the grandchildren. They are perfectly contented without teeth and do not want to be bothered with artificial substitutes. The daughter may decide that mother does not look so well when she comes into the drawing room on bridge luncheon day and decides therefore that she must have some teeth. Accordingly she is taken to the dentist very much against her will and is an unwilling patient. She shows no interest in the case as you proceed with the work and anything that you do for her is all right. Daughter stands around and makes all decisions as to size, mold and color. The mouth may present very favorable conditions and you may produce a very fine fitting case but she never wears them for the reason that she did not want them.

All of the neighbors know that you are making these teeth and are anxiously awaiting the day that grandma will come home with her new teeth. When they see that she is not wearing them, they will inquire as to the reason, and of course the daughter will find some fault with your work. All cases require some adjustment and this old lady will not wear the case long enough for these to be made. And, "they made her mouth sore" is the reason she never wears them and of course the dentist is to blame for this soreness. The dentist stands a good chance of losing some very nice business because grandma did not wear her teeth. Grandpa comes in the same classification.

The Philosophical Mind

This mental type gives the dentist the finest cooperation . They do not consider that the loss of the teeth is the greatest misfortune that could befall them. It is

true that they are sorry that they have lost their teeth but will look upon it as a matter of course and will congratulate themselves that they are enjoying better health. They have now come to you because they want some artificial substitutes and they have confidence in your ability to produce them. This type of patient will often say, "Doctor, I know you can fix me up all right, and you are going to fix me up in fine shape." This type of patient will often wear a misfit and will put up with discomfort rather than return for adjustments, feeling that they can adjust themselves to the condition.

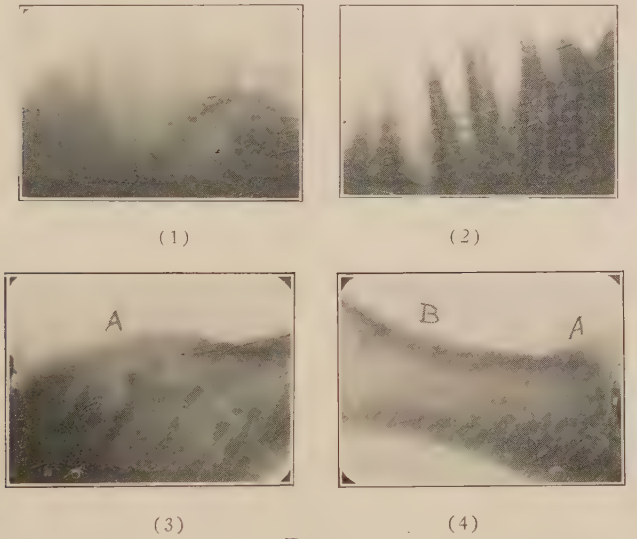

FIG. 1.

X-Ray Findings

One should not begin the construction of dentures without first making a complete X-ray diagnosis. This should be done for self-protection as well as to guard the patient's interests. Cases are on record where dentures were made over unerupted and impacted third molars and worn for a time, resulting in Osteo-myelitis and the

loss of half the mandible. An X-ray diagnosis would have prevented this situation. It is common practice to make complete radiograms of the mouth before extraction. This should be followed by a radiographic study of the mouth just before beginning the construction of the dentures. The exodontist can know that he has left no broken roots, no impacted teeth, and no supernumerary teeth, but he cannot know sixty days later whether or not nature's process of repair is progressing normally, without the taking of additional radiograms.

At present we know very little about Calcium metabolism, but we are aware of its importance in its relationship to denture construction. By observation in practice we find what might be termed the Hypercalcium, the Hypocalcium and the normal bone of the maxilla and mandible. These types can be determined in the predenture cases by means of roentgenograms. The color tones of standardized films reflect degrees of bone density.

In the Hypercalcium bone we see the dense appearance of the trabeculæ, light color tone areas of eburnation and hypertrophy. Dentures built on this type of bone do not lose their stability because of atrophic changes for long periods.

In the Hypocalcium bone we see the dark color tone and especially the wide open spacing of the trabeculæ. In this type of bone, artificial dentures should be remade every third year to keep pace with atrophic changes.

Most of the edentulous cases fall into the class of Hypocalcium and normal bone. Most patients with Hypercalcium bone continue through life with their full complement of natural teeth. The percentage of Hypercalcium type edentulous case is estimated at about 20 per cent.

We have the uniform alveolar atrophy, the serrated mandibular alveolar atrophy, and the mixture of atrophy and hypertrophy, this latter being seen more frequently in the maxilla where we have atrophy of the bone and hypertrophy of the soft tissues.

The average patient does not understand why his case should require rather frequent rebasing while some of his friends have worn dentures for years without marked changes in the mouth. The result is frequently a condemnation of the dentist who has made the case and perhaps a change of dentists. Too often, if surgical preparation of the mouth has been made, the fact is grasped as an alibi, and thus the stigma is shifted to the exodontist. With proper study of the X-rays we can determine in advance the possible rapidity of absorption and so inform the patient and thus save ourselves later. When we learn more about Calcium and Phosphorous metabolism we may be able to remedy this situation. Calcium metabolism is certainly a subject worthy of consideration.

In Fig. I (4) B, we have a normal bone showing complete closure of the alveoli and with a laminated surface well adapted to resist the forces of mastication. At A we see an area not completely calcified.

Fig. I (1) shows Hypocalcium Bone. Fig. (2) is a radiograph made six months after extraction. Here the process of calcification has not even started.

Arch Size

The arches are classified into large, medium and small. The large arch of course offers the least trouble from a standpoint of retention. The greater the areas in contact, the greater will be the force of adhesion between these areas. The large arch will resist the greater force

in mastication with a maximum of comfort. Due to an underdeveloped maxilla, or an overdeveloped mandible, or both, we may have a small maxilla and a large mandible presented in the same mouth. This condition may be reversed but is rare. In the first instance we have the case of prognathism which causes considerable trouble in the set-up and in the articulation. In such an extreme case it may be necessary to resort to the "crossbite" method of setting up the teeth. The upper right posteriors are placed on the lower left and the upper left posteriors are placed on the lower right. The lower posteriors are reversed and placed on the upper denture. The lower second bicuspids are discarded.

Arch Form

The arches are classified into Ovoid, Tapering and Square. This classification will lead one to so arrange the teeth as to harmonize with the classification in hand. The tapering arch will call for a set-up which produces more or less of an acute angle between the centrals. The square arch calls for an arrangement which puts the four incisors practically in a straight line with more or less of an abrupt turn backward at the cuspid. The Ovoid Arch calls for somewhat of a compromise between these two extremes. There is one outstanding difference in the posterior as between the Tapering and the Ovoid arches and that is the distance between the tuberosities. In the Ovoid it will be found that this distance is much less than in the Tapering. This should be kept in mind when setting up the second molars. For the purpose of securing a better occlusion and for giving the tongue more room, the second molars are frequently set farther outside the ridge than are the first molars. This is not permissible as a rule in the Ovoid arch.

Ridge Form

This classification does not have reference to the ridge as a whole. One may find the anterior portion of the upper ridge normal and find large bulging tuberosities in the same mouth. The time to recognize this condition

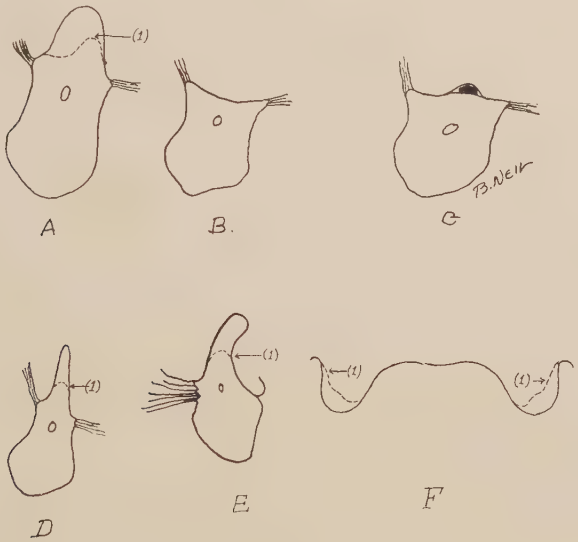

FIG. 2.

is before the case is started rather than wait until the set-up is started to find there is not room for the molars. These large tuberosities must be surgically removed but the exodontist should be careful to at least have their buccal surfaces parallel. If too much is removed from the buccal plate of process it will be found that these surfaces converge toward the crest of the ridge which produces a ridgeform that will rob the dentures of much of their efficiency. Fig. 2F (1). If only one tuberosity is enlarged and this only in a minor degree, it may be left undisturbed. If both tuberosities are enlarged only to a minor degree and there is a reasonable amount of

soft tissue over them it is advisable to leave them undisturbed.

The thin "knife-edged" ridge certainly should not be expected to support dentures, as only disappointment will be the result. These should be surgically prepared as shown in Fig 2D (1). These are reduced in height and the surface supporting the denture is more nearly at a right angle to the line of force applied in mastication. This increases the stability of the case as well as the efficiency in mastication.

Hard spindle-shaped nodules found on the lingual surfaces of the mandible on either side of the median line offer an obstacle to success which cannot be overcome without their surgical removal. The dentures absolutely will not be satisfactory when built over these. These are always found to extend below the border tissues, thus forcing the margin of the denture across these nodules and resulting in trauma and acute pain.

A cross-section of the ridge at the median line will reveal a leaning of the ridge toward the labial resulting in a distinct undercut upon the labial as shown in Fig. 2E. This undercut will antagonize the undercut often found in the lateral throat form areas. This undercut on the labial is a definite obstacle to success and must be removed as shown in Fig. 2E (1).

A cross-section of the mandibular ridge in the molar region will reveal a series of ridge forms from the extreme broad thick ridge, Fig. 2A, to the extreme concave surface in Fig. 2B. As between these two forms, the author certainly would prefer the concave form especially if it were accompanied by a class one lateral throat form. There is, however, a happy medium between these two extremes which we should consider as the most de-

sirable. This is shown in Fig. 2A (1). This ridge has sufficient height to prevent the lateral shifting of the denture in mastication and at the same time it has a more favorable form for resisting the forces of mastication. The ideal stress bearing area in a mandibular denture would be at right angle to the lines of force. This would be ideal if it were possible to prevent the lateral shifting of the denture upon this flat area. Since this is impossible, we accept the ideal ridge as being the one with sufficient height to prevent this lateral shifting of the denture.

At this point the author wishes to stress the fact that by making use of the lateral throat form area, much of this tendency to a lateral shifting of the denture in mastication is overcome. This lateral throat form area is a perpendicular area and is on the inner surface of the ramus and is therefore not involved in the process of absorption. Even when we have no semblance of a ridge, this lateral throat form area (when class 1) is a blessing. Some of the most outstanding and successful cases of the author have been in those cases where the ridge form was as in Fig. 2B and 2C with a class 1 lateral throat form. Here we have a stress-bearing area which practically forms a right angle with the lines of force in mastication thus favoring stability and along with this we have a lateral throat form area which prevents the lateral shifting of the denture in mastication. This gives us a combination of conditions (assuming a balanced occlusion) which gives us the greatest possible stability. It must be remembered, however, that even with these conditions present failure will await us unless we continue on to the end with a rebasing process which will insure a distribution of these forces over these areas

with due consideration for the relative resiliency of these areas.

In further consideration of these concave mandibular ridges the author would call attention to the sharp angle of bone formed by this concave surface as it meets the lingual surface. This is often an acute angle and is found at the extreme distal of the mandibular ridge. It is found by placing the end of the index finger in this concavity just anterior to the retro-molar pad and passing the finger across until it passes on to the lingual. It thus passes across this sharp edge of bone. This sharp edge of bone is *not* the Mylo-Hyoid Ridge. It is continuous with the internal oblique line of the retro-molar triangle and before the teeth were lost it was from two to six mm above the Mylo-Hyoid Ridge. Following the extraction of the teeth and due to absorption it has migrated downward until it is now continuous with the Mylo-Hyoid Ridge. The author has named this the Mylo-Hyoid Spine. It is distal to the point where the last fibers of the Mylo-Hyoid muscle are inserted and is therefore distal to the Mylo-Hyoid Ridge. This Mylo-Hyoid Spine should be surgically removed when it is found to be very sharp.

Ridge Relations

By this is meant the positional relationship between the upper and lower ridges. These are classified as Normal, Prognathous and Orthognathous. Fig. 3. This of course has to do with the anterior portion of the ridge. A mouth may present a normal ridge relation in the anterior and then due to a broad mandible and a narrow maxilla we may find an abnormal relationship in the distal. The prognathous relationship (Fig. 3C) is looked upon as most difficult condition to overcome. If the upper an-

terior teeth are set too far forward in at attempt to compromise the condition it spells failure for the upper case. One must set the lower anterior teeth back upon top of the ridge and then attempt to bring the uppers so as to give an end-to-end relationship. As a general rule to follow it might be said that the anteriors should always be free of contact even in normal cases. This being true, it is permissible, in these extreme prognathous cases to set the

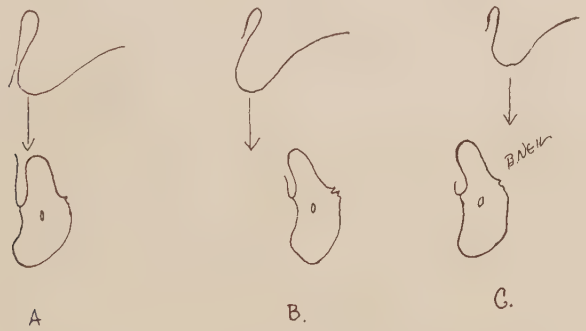

FIG. 3.

A, Normal; B, Orthognathous; B, Prognathous.

upper anteriors inside the lower anteriors. The author has built a number of such cases.

In the orthognathous cases (Fig. 3B) one should always give an overjet. This is frequently found necessary in the extreme tapering type of arch. In giving an extreme overjet, one should leave out one of the lower incisors rather than attempt to put in the full number of a smaller size. The larger teeth with one missing gives a much better esthetic effect. In cases not so extreme, the desired result can be attained by staggering and crowding the lower anterior teeth, in fact, this should be resorted to in all cases to a small degree.

Throat Form

The contour of the hard and soft palate considered

collectively is known as Throat Form. When these two surfaces form a curve that is unbroken by an angle at their junction it is known as Class I Throat Form. This broad sweeping curve to the palate places the soft palate at a high level and makes postdamming easy and also makes it possible to carry the distal of the upper denture farther onto the palate. Fig. 4, B1.

When the soft palate drops into a perpendicular position from the distal of the hard palate it is known as a Class 3 Throat Form. Fig. 4, B3. The intermediate condition is known as a Class 2 Throat Form. Fig. 4, B2. This Throat Form contour will influence us in the postdamming and in the length of the upper denture. When we have a Class One Throat Form it is permissible to make the denture longer than in class three. The Tensor Palati muscle is attached to the distal edge of the horizontal plate of the palate bone and passes across to the hamulus, parallel with the mucous surface of the denture in these class one cases. We have here an obtuse angle angulation of this muscle in function. Muscles that function around the denture margin at an obtuse angle angulation can always be impinged upon slightly without ill results. There are two such muscles, viz., the one just mentioned and the Superior Constrictor which functions in contact with the distal edge of the lateral throat form flange of the lower. When we have a Class 3 Throat Form we have the Tensor Palati muscle functioning at more of an acute angle angulation and we therefore have to be more careful in our postdam and in the extension of the denture in order to avoid an irritation at this point.

Lateral Throat Form

This is the contour of the hard lingual surface of the

mandibular ridge in the molar area and the velum-like tissue distal to the internal oblique line of the retro-molar triangle considered collectively as they function under the influence of the muscles of the tongue. This classification is made with the tip of the tongue protruded to its most anterior functioning position which is

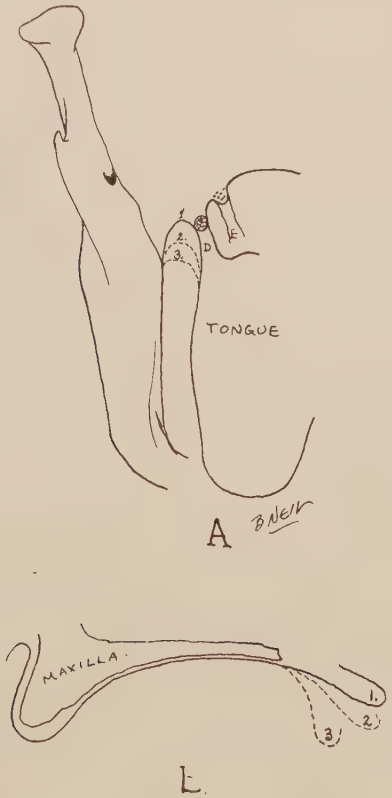

FIG. 4.

one-fourth inch beyond the red line of the lip. Fig. 12. The index finger is placed with its tip in gentle contact with the curved wall of mucosa distal to the internal oblique line of the retro-molar triangle (Fig. 12C) with the nail toward the tongue. The hand is now completely re-

laxed and offering no resistance to the lateral throat form tissues as they move under the control of the tongue. The patient is now instructed to protrude the tongue as in moistening the lips one-fourth inch anterior to the red line. When the tongue has arrived at this position the tissues in contact with the tip of the finger have been drawn to their most anterior functioning position. These tissues are known as the lateral throat form tissues and must be considered as border tissues to the lower denture. The denture margin must function here if we are to have a peripheral seal and the greatest degree of comfort and efficiency. If the lateral throat form tissues displace the finger entirely from its position it is placed in the class three. Fig. 4, A3. If the operator feels only a slight tension of the tissues around the end of the finger and there is no tendency to displace the finger it is considered a Class 1 Lateral Throat Form (Fig. 4, A1) and the denture margin must function here to get the greatest degree of comfort. Any position of the tissues between these two extremes is known as Class 2 Lateral Throat Form. Fig. 4, A2.

It must be remembered that all of these tissues have a co-ordinate functional action which is controlled by the tongue. Therefore, when the tongue is in its extreme anterior functioning position the lateral throat form tissues as well as the floor of the mouth are also in their extreme functioning position. When the tongue is at rest or even when functioning in enunciation, the lingual border tissues and the lateral throat form tissues are at their lowest and most distal positions respectively. The extension of the lingual border of the denture is determined absolutely by the function of these tissues as con-

trolled by the tongue in its function to freely moisten the lips. Subsequent chapters on impression technic will demonstrate this point.

The student will do well to study the anatomical analogy between throat form and lateral throat form. Both terms have to do with mouth surface contours, the former being related to the maxillary denture and the latter being related to the mandibular denture. Each has a hard fixed surface merging into a velum-like and mobile surface. The mobility of the velum-like surfaces is controlled by the same group of muscles and activated by the same motor nerve. There must, therefore, be a co-ordination in these movements. The Palato-Glossus muscle passes from the soft palate into the side and base of the tongue forming the anterior pillar of the tonsil. Fig 12AA. When we have a Class 3 Throat Form we must of necessity have a condition in the lower at least approaching this and therefore we expect to find a Class 3 Lateral Throat Form. The soft palate rises and falls under the influence of these muscles and functions in the horizontal plane. The Lateral Throat Form area moves forward and backward in the perpendicular plane under the influence of the same muscles. An intensive study of the functional requirements of these tissues will enable one to build better dentures.

Fig. 4, A1 represents the velum like tissue which with the hard lingual surface of the mandible gives us the class one Lateral Throat Form. When the tongue protrudes in function this velum like tissue moves forward and upward and is a border tissue to the denture. It may assume position 2 or 3 as shown in Fig. 4A thus denoting its proper classification. If we place this tissue in its proper classification we may proceed to the

scientific construction of the denture margin which will be in harmony with the functional requirements of this tissue and the tongue. Refer to Fig. 4B which shows the three Throat Form Classifications and then turn the book a quarter turn to the right and observe the drawing at A. The anatomical analogy is apparent, the velum like tissues in both Throat Forms being border tissues to the upper and lower dentures respectively.

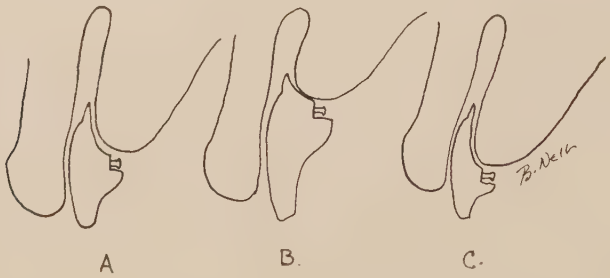

FIG. 5.
A, Average; B, Short Ridgelap; C, Long Ridgelap.

Lip Ridge Relations

This is a phase of mouth study and classification that has been neglected during these latter years. The author remembers very distinctly that he received some very fine instruction along this line during his freshman year. One hears very little of it now. As an illustration, there was the patient with the full and long upper alveolar ridge with the vermilion border of the lip when at rest only slightly below this ridge. The Levator Anguli Oris and the Levator Labii Oris Ala Que Nasi muscles being very active would give this patient a very high lip line. The old professor used to say that the lip raised like a window shade. There was only one mold of vulcanite tooth that could be used in this case and the manufacturer made them at that time. Why they were discon-

tinued has been a mystery to some of us. This was the Long Ridge-Lap and Short-Bite tooth. Fig. 5C.

The High-Lip Line is the highest position to which the upper lip is raised in laughter. The Low-Lip Line is the lowest position to which the lower lip is depressed. The middle lip line is the rest position of the vermilion border of the lip. The relationship of the Middle-Lip Line and the High-Lip Line to the crest of the ridge is known as the Lip-Ridge relation. This classification will determine the type of tooth to be used in a given case as regards the ridge lap and bite of the tooth. Fig. 5 will illustrate the several relative positions of these tissues and the type of tooth required for each.

Tissue Tone

By this is meant the tonicity or strength of the tissues with the normal state of health taken as an ideal. These three types are High, Medium and Low. Especial attention is given to the muscle tissue as it acts in function. In the young or middle-aged patient in good health the muscles are found to be plump with a snappy action and rebound that is characteristic in the young and healthy patient. This is known as Class 1 or high tissue tone. The other extreme is found in elderly people whose general nerve system is beginning to disintegrate. The muscles are thin and have lost that snappy reaction of youth. The best way to examine for muscle tone is to place the index finger inside the cheek with the thumb on the outside of the mouth, rolling the tissues between the thumb and finger. When these cheek tissues are thin and offer little resistance to the fingers it is a Class 3 tissue tone. In this class the tissues seem to hang in drapes upon the face. One may find a Class 3 tissue tone in cases of patients convalescing from wast-

ing diseases. In this case, however, this would be a temporary condition which might revert to a Class 1 upon complete recovery. The practical application of the information gained in this classification is as follows: In Class 1 (high) tissue tone it must be remembered that these tissues will dislodge the denture if there is the slightest interference with their functional range, therefore the greatest care must be taken that there be no over-extension of the margins. The reverse is true of Class 3 or low tissue tone. Because of the feeble action of these Class 3 tissues it is permissible to slightly overextend the denture margins, in fact, this must be done if there is to be a peripheral seal. A slight over-extension of the denture margin here will not result in soreness because the tissues are so feeble that they cannot pull hard enough to create soreness and because of their enfeebled condition they do not possess enough strength to dislodge the denture. Do not think, however, that you can put these tissues under too much tension as this will result in a permanent stretching of the tissues. Living tissue when placed under constant tension will stretch and adapt itself to this condition or new length, provided this tension is not great enough to create an abrasion or ulcer. This slight tension of the tissues in the case of the low tissue tone does not bring about this permanent change for the reason that this tension is intermittent. It is only applied to the border tissues by the over-extended margin when the mouth is opened wide for the reception of food, or in yawning.

The author has seen several freak mouths showing an abnormally extended denture. When you pin the wearer down to the truth and get the history of the case you find that they have been wearing dentures for years and

that they have had many cases made, each one with the margins slightly more extended. If the denture margin is not stopped at the functioning position of these border tissues, this over-extension may result in a permanent stretching of the tissues to which there is no limit in the progressive construction of new cases. The wearing of rings in the lips of some of the natives of the South Sea Islands is a striking example of what living tissue will do when subjected to permanent tension.

Tissue Resiliency

This has reference to the tissues under the denture that carry the load in mastication. We have Classes 1, 2 and 3.

Class 1 is the ideal condition where we find the periosteum covered with a normal amount of resilient tissue to a thickness of about two millimeters. This acts as a cushion and shock absorber to the forces of mastication and prevents an abrasion of the tissues by the denture. Class 2 is the ridge that is devoid of resiliency to the extent that the tissues are thin and very dense. If we should have combined with this Class 2 condition a deficiency of saliva (dry mouth) we have the most obstinate source of trouble that could be encountered. A dry mouth devoid of resilient tissue will surely result in poor stability which will be accompanied by an abrasion of the tissues resulting in soreness. The Class 3 tissue is the ridge which is extremely resilient presenting a soft, flabby ridge. If an impression of this ridge is taken in plaster and a cast poured representing this flabby ridge at a state of rest it will be found that a denture built upon this cast will move with the tissues when masticating pressure is applied and the degree of stability will be very poor. This may be overcome to a certain extent by taking the

impression in compound and thus procure a cast representing the tissues under pressure. This pressure, however, if too great may result in an atrophy of the tissues resulting in poor or no retention at all within a short while.

Modeling compound is the impression material that should be used in all cases where we have a soft spongy ridge. The physical property of this material makes it possible for us to place this tissue under pressure and thus secure a greater degree of stability. This pressure, if too great, will result in an absorption which will call for a rebase. However, if the balance in the occlusion is maintained, this rebasing can be considered as a treatment measure and this flabby ridge thus reduced to more nearly represent a normal tissue condition as well as a more perfect ridge form. It is physically impossible to take a plaster wash in cases that present this flabby tissue condition.

Saliva Conditions

Saliva is classified from a standpoint of quality and quantity. When we consider quality we have the normal viscosity, and the high viscosity. As to quantity we have the deficient, normal, and copious. Of course, the ideal condition would be to have a normal quantity of a normal viscosity. We do not often find this in patients who have reached the average denture age as all secretions diminish as the patient advances in age. The patient with a deficient flow of saliva (dry mouth) offers one of the most difficult physical conditions to overcome in the building of full dentures. This is due to some constitutional disturbance and the patient should be referred to the internist. However, if this happens to be a patient well advanced in years, the internist will be

powerless to render aid as the condition is the result of age. A patient in middle life may have a temporary disturbance which may be overcome.

When delivering dentures to a patient suffering from a deficient flow of saliva, the surface of the denture should be rubbed with a bit of vaseline. This will act in the place of saliva as a binder and will prevent abrasion. This will have to be applied by the patient each time the dentures are inserted.

Tongue Conditions

This is a phase of mouth study that has been neglected by the prosthetists. As far back as 1918 the author began a study of the function of the tongue. The normal tongue is classified as to width, length and form. These several conditions will influence its functional range of movement and will therefore at the same time determine the functional range of the tissues constituting the lingual border tissues of the mandibular denture. It is a fact that cannot be overlooked that the tongue in function determines absolutely the functional range of these tissues.

We have the tongue that to a given individual is normally broad and short while in another individual the tongue may be normally long, narrow and pointed. Observation over a period of years has proven that there is a definite relationship between the general physique of the patient and the tongue form. The short, stockily built individual with a large short neck will invariably have a short, broad and heavy tongue. All muscles of such an individual including those of the mouth and throat are short and heavy and we therefore have a restricted denture space. These short heavy muscles will dislodge a denture more easily and quickly than the long

thin muscles. Observation over a long period has convinced the author that it is more difficult to build efficient dentures for such an individual than for the physical type represented in Abraham Lincoln.

The tall and thin individual will have a long neck and therefore the muscles in this region including the mouth will be long and narrow. The tongue of such an individual will be long, narrow and pointed. Such an individual will have a much larger denture space than the other extreme, and the tissues will not act to so easily dislodge the dentures.

The broad short tongue has a shorter anterior-posterior functional range than the long, narrow tongue. These facts are taken into consideration in the classification of Lateral Throat Form. The normal function of the narrow pointed tongue is one-half inch outside the red line of the lower lip, while the normal function of the broad, short tongue is one-fourth inch outside the red line of the lip. When studying tongue conditions it will be noted that the broad, short tongue always presents a higher muscle tonicity than the narrow tongue and therefore we have a tongue that is stronger and at the same time requires more lateral space in which to function. Why this is true is not clear but clinical evidence has proven this to be a fact. These two conditions make the stability of the denture less certain.

Abnormal conditions are found in the tongue which may be considered as temporary. These are the result of abnormal function. When the patient loses all lower posterior teeth and no artificial substitutes are worn for several years, it will be found that the tongue has shortened and increased its breadth until the lateral edges are now functioning in contact with the buccal mucosa

and lying above the crest of the mandibular ridge. The tongue normally fills the oral cavity and functions within the limits of the dental arch (laterally). When the dental arch is lost, the tongue will enlarge by increasing its breadth at the expense of its length, to fill the new space. This change in tongue form due to abnormal function is also found in all other muscles, especially those which have no bony insertion. When an occlusion breaks down, we begin to have abnormal function and this is reflected in all of the muscles of the lower portion of the face and the muscles of the neck and throat resulting in abnormal expression. The only remedy is to restore the occlusion and thus restore these muscles to a normal function which will in turn bring the expression back to normal.

The application of the above facts are as follows:

In classifying Lateral Throat Form we must allow the long narrow tongue to function one-half inch outside the red line of the lip, while the broad tongue is allowed to function only one-fourth inch to this position. It must be remembered that the normal tongue functioned with its edges in contact with the lingual surfaces of the teeth. If these teeth have been missing for quite a time and we find the edges of the tongue now in contact with the buccal mucosa we are certainly in for some trouble. The teeth must be set up to a definite relationship to the ridge which will crowd the tongue back to its normal position. The tongue will at first rebel against this and it will require some time for it to readjust its form to its original and normal state. While this readjustment is under process, the tongue will act to dislodge the denture, which will of course discourage the patient causing him to return with this complaint. If you have

waited until this complaint is registered before explaining the conditions to the patient, they may have little faith in your explanation and accept it as one of your alibis. If this is all explained in advance, it will increase the patient's confidence in you and bring about a closer co-operation. If the patient will persist in wearing the denture, the tongue will return to its original length and breadth and the trouble will disappear. One should under no circumstances carve a concavity in the lingual surface of the denture to accommodate this broad tongue. These concave surfaces favor the continuance of this condition and the tongue will certainly function in this abnormal space created for it. The edge of the tongue functioning in these concave areas will have a tendency to unseat the denture. The lingual surfaces of the mandibular denture should be as nearly parallel as possible and in the perpendicular. The diameter across the occlusal should never be less than the diameter at the lingual margin of the denture.

Similar tissue conditions are encountered in the lips where the individual has never worn artificial dentures, the mouth remaining edentulous for years. The fibers of the Orbicularis Oris muscle will shorten and the lip becomes taut and devoid of its normal pliancy due to lack of function. The author has seen numbers of such cases where the lip has assumed a tough, leather-like nature, lying back upon the top of the alveolar ridge. Here we again have a change in muscle fibre length due to abnormal function. This muscle having no bony insertion functions over the dental arch as a support. When this support is lost, the shortening of the muscle is the inevitable result. In these extreme cases the only remedy is the splint, the use of which requires the posi-

tive co-operation on the part of the patient. The lip tissues are so taut that it would be impossible to place teeth in their normal position. The splint is a denture with an occlusal rim which acts as a support to the lip tissues. This splint may be held in position with Gum Tragacinth, and if worn will soften and stretch these muscle fibres. As these muscle fibres soften and stretch, compound may be added to the labial surface of the splint and thus maintain the tension until the desired result is attained. The author would again call your attention to the practice of the South Sea Islanders of stretching their lips to these hideous dimensions as an example of what it is possible to accomplish.

FIG. 6—BORDER TISSUES.
A, High; B, Medium; C, Low.

Border Tissue Attachments

Here we have a consideration of the point of attachment of the border tissues to the alveolar ridge as related to the crest of the ridge. Class 1 is a high attachment on the upper or a low attachment on the lower. This means that in this condition we will have the least tendency on the part of these tissues to dislodge the denture and therefore this is the favorable border tissue attachment. Class 3 is where the tissues are attached very near the crest of the ridge. This is of course the objectional condition. The entire mucous fold may have such an attachment, or we may find the border tissues as a whole normal with only the buccal or lingual fraenum present-

ing a Class 3 attachment. Class 2 is the intermediate condition. See Fig. 6.

The recognition of these extremes does not mean that there is a wide range in the normal insertion of these tissues. In a Class 3 border tissue attachment, these tissues are attached to the bony landmarks at their normal positions and the condition present is the result of the loss of process. The case of the Class 3 attachment of the fraena is of course an abnormal attachment and may be corrected surgically. When border tissues have a

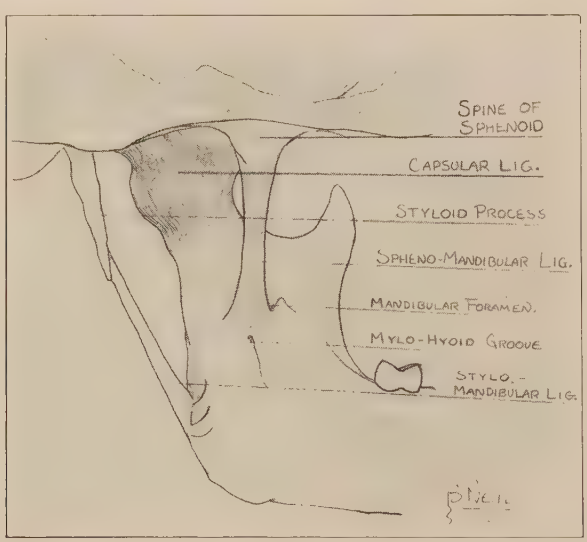

FIG. 7.

normal attachment they certainly should not be interfered with surgically. To do so is to create scar tissue which may cause more trouble than the abnormal attachment.

Adhesions in these areas should be recognized and differentiated between this and an abnormal attachment. These adhesions should certainly be dissected up so as to

approach the normal. The Labial Fraenum should never be "clipped." When it is found inserted near the crest of the ridge, it should be dissected out and re-attached at its normal point of insertion.

Condyle-Meniscus Conditions

This is one phase of mouth study that cannot be made complete until the case has been started and brought to

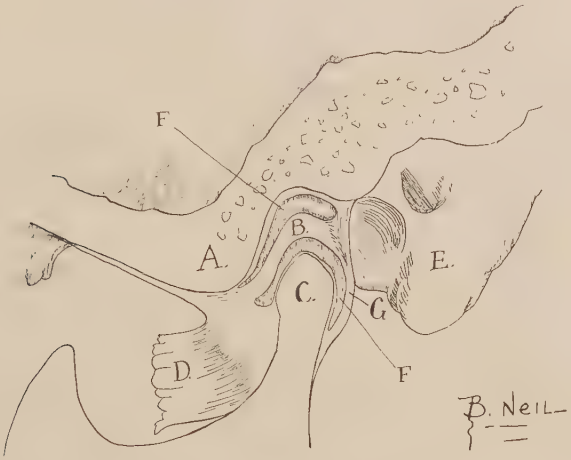

FIG. 8.

A, Articular Eminence; B, Meniscus; C, Condyle; D, Ext. Pterygoid; F, F, Synovial Sacs; G, Capsular Ligament.

the point where we have occlusal rims for use in the study of mandibular function. The author will not attempt a thorough consideration of the function of this joint as that would imply a discussion of the principles of occlusion which is not within the province of this book. Since, however, a thorough knowledge of the function of this joint is necessary to the successful practice of full denture prosthesis, we will give it some consideration.

The Temporo-Mandibular joint may be described as a diarthroidal of the ginglymus type. The ligaments of the joint are the Capsular, Temporo-Mandibular,

Spheno-Mandibular and the Stylo-Mandibular. Fig. 7. The arrangements of the ligaments are such as to allow a sliding movement forward. This sliding movement takes place as the mouth opens and also when the upper and lower incisors are brought into an end-to-end relation.

The articular capsule or articular ligament encloses the joint cavity. Fig. 7. Above, it is attached posteriorily, laterally and medially to the margin of the mandibular fossa, and, anteriorily, to the anterior margin of the eminentia articularis. Below, it is attached to the neck of the condyle. Between its upper and lower attachments it is connected with the margins of the articular disc. Fig. 8B. This articular disc divides the capsular ligament into two cavities, each being filled with synovial fluid. F. F. This fluid in the lower cavity bathes and lubricates the condyle head while the fluid in the upper cavity bathes and lubricates the glenoid fossa. A cross-section of this articular disc will reveal its lower surface to be concave in harmony with the convexity of the condyle head while its upper surface is concavo-convex in harmony with a similar contour of the glenoid fossan and articular eminence. The centre of this disc is thinner than the edges and the condyle head functions against this thin centre. The condyle head does not slide over the surface of the disc but the two move in co-ordination and thus maintain the same relationship at all times. This is due to the action of the Spheno-Meniscus muscle (Fig. 9, 2) which is attached to the anterior surface of the capsular ligament directly opposite the edge of the articular disc. When the External Pterygoid muscle (3) acts to pull the condyle forward, the co-ordinate action of the Spheno-

Meniscus muscle (2) carries the articular disc (1) forward in a co-ordinate movement. Therefore when pressure is applied to the disc by the condyle, this pressure is applied at its thinnest portion. This particular disc being compressible together with the fact that all of the synovial fluid may pass from behind the condyle to a point in front of the condyle gives us a possible centric relation that is distal to the functional centric relation.

There is a direct relation between the form and arrangement of this joint and the form and cusp height of the teeth. A study in comparative anatomy will quickly convince one that this is true. The Carnivora have a Temporo-Mandibular joint that permits practically no lateral movement. They have long sharp cusps and canines that so interlock as to make such a movement practically nil. The herbivora have a Temporo-Mandibular joint that permits a wide lateral movement and a dental armament that also permits such a movement. In man the teeth are so arranged as related to this joint, that the peridental membranes carry all the load, there being in this joint a condition which the writer is pleased to call a "balanced tissue tension."

A study of Fig. 10 will show parallel lines through the condyle head A, the line of force B, and the molar teeth C. It will be seen that the condyle head and the meniscus at A and the molar teeth at C are practically equidistant from the application of masticating force at B thus giving us a nicely balanced condition with no overload upon the meniscus at any time. This is considering the Mandible as a lever of the third class with the condyle head as the fulcrum. If one will consider the distance from the third molar, or even the second molar to the application of force at B, it will be seen

that this, the working arm of the lever is much shorter than the power arm, and that very little load is placed upon the meniscus and condyle head. Ninety-five per cent of all lower dentures are so short that the molar teeth are placed so far from the line of force at B, that we invariably have the working arm of the lever too long and thus place too great a load upon the meniscus. This is then doubly aggravated when the last molar is left off the denture and only damage to the joint tissues can result. The author has always given especial attention to the placing of the posterior teeth as regards their anterior-posterior dimensions. In the case of the long mandible with the small narrow ridge, one should select posterior teeth as for a small mouth and then add an extra molar or bicuspid. This was often necessary in the negro dental college clinic. If the power and working arm of this lever are in harmony, and accompanied by a balanced occlusion, followed by a balanced tension of the tissues under the denture as produced in a scientific rebase, one will arrive at a condition referred to by the author as a "Balanced Tissue Tension," which alone can bring to the patient the greatest comfort.

Fig. 10X shows the lengthening of the working arm of the lever due to the loss of the molar teeth, thus placing the greatest load upon the meniscus. A shortened lower denture produces the same evil results.

A case was reported to the writer of a man fifty years of age and of fine physique who had worn dentures for seven years in comfort, using them efficiently in mastication. To use the patient's expression, "A soreness developed in the left ear." This soreness increased over a period of six months to a point where he could no longer use the dentures. Upon examination of the case it was

found that the dentist had left the second molar off of the left side, thus lengthening the working arm on this side. This threw the load back upon the meniscus and after seven years we find this meniscus punctured. It has been claimed many times that the closing of the bite as a result of a broken down occlusion is the cause of this

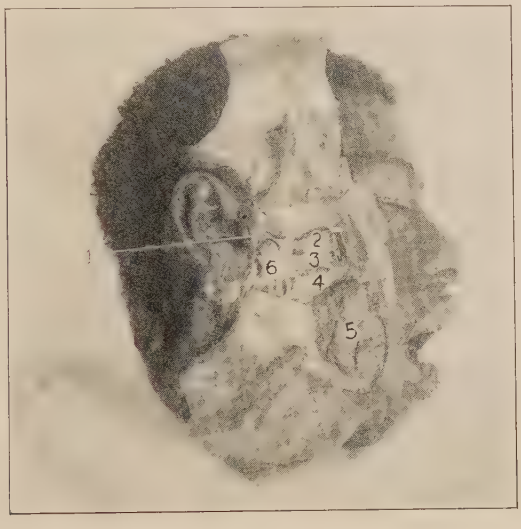

FIG. 9.

1, Meniscus; 2, Spheno-Meniscus Muscle; 3, Ext. Pterygoid; 4, Internal Pterygoid; 5, Orbicularis-Oris; 6, Neck of Condyle.

damage. Bites have been opened and the condition corrected and the conclusion reached that the "opening of the bite" should be given the credit. There is no doubt but that these cases should be opened but let us be fair and say that we did more than open the bite and therefore other conditions which were corrected had something to do with the relief of this condition. To open the bite to its correct dimension and leave the molar teeth off of one side will not correct these evils.

In the case above referred to the author took facial dimensions with these dentures in position. New dentures were constructed being careful not to open the bite, leaving the facial dimensions as in the old condition. These forces were distributed by so selecting teeth that the molars and the meniscus were equidistant from the lines of force. The pain began to disappear and in thirty days the patient was using the dentures in comfort. This bite should have been opened but this plan was resorted to in order that we might prove the great importance that should be given the arrangement of these teeth. It was the author's privilege to go to the anatomical laboratory of the University of Iowa as the guest of Dr. Prentiss. To be the guest of such a man is a pleasure never to be forgotten. I give some of his conclusions. A meniscus that is once punctured is not repaired. At least there was this doubt in his mind. In the correction of the occlusion the capsular ligament is brought back to its original length, Fig. 7, thus reducing the size of the opening in the meniscus. The condyle head now functions in contact with the surface of the meniscus around the margin of this puncture.

It is not difficult to diagnose this condition as we have pain accompanied by crepitus as the condyle functions in direct contact with the glenoid fossa. Damage to this joint to a lesser degree is best determined by inserting occlusal rims on trial plates and have the patient function these in contact. When an occlusion has broken down upon one side, the patient naturally becomes a unilateral chewer, if this condition is allowed to exist over a period of years. This results in ligament changes and jaw movements which become habitual. When trial plates are inserted into such a mouth and the patient in-

structed to give a direct protrusion, it will be found that they will give their habitual lateral movement and in some cases they are powerless to give a direct protrusion. In the average patient an occlusion approaching the normal will correct this habitual movement. In very old people in poor health it is doubtful if one should attempt the complete correction of the defect. The ligaments upon this habitual working side have shortened over a period of years, not having been extended to their full length. A disuse atrophy has aggravated the condition. An attempt to correct this in the aged patient may result in failure. If the patient is enjoying good health and will co-operate to the extent of using the case, these ligaments will return to their original length and functional range.

The Angulation of Muscle Function

So far as the author is aware, this has not been definitely discussed by other writers. By this phrase is meant the angle formed by the muscle with the margin of the denture against which it functions. For example, the Buccinator muscle passes abruptly upward from its point of insertion in the mandible to form an acute angle with the margin of the lower denture. Fig. 11A (1). The Mylo-Hyoid muscle passes obliquely downward and forward away from the Mylo-Hyoid ridge, thus forming an approximate right angle with the lingual margin of the lower denture. Fig. 11A2. The Superior Constrictor muscle passes backward and slightly inward and away from the distal edge of the lateral throat form flange of the lower denture and functions almost parallel with the inner surface of this flange, giving us an example of the obtuse angle angulation. Fig. 11B1. The Tensor Palati, being attached to the distal edge of the

horizontal plate of the palate bone, is an example of the obtuse angle angulation. This is a very important bit of practical information to be gathered from this study and should govern us in the forming of our denture margins at these points. The muscle that forms an acute angle angulation as it functions

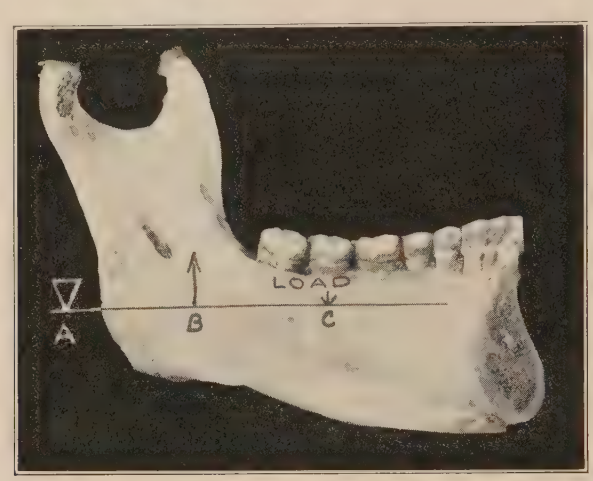

Fig. 10.

around the denture margin will tolerate no over-extension of the denture margin. These margins, too, must be round and smooth and must under no circumstances interfere with the function of the muscle. The muscle that functions at an obtuse angle angulation to the denture margin does not pull around that margin. It functions almost parallel to the inner surface of the denture and even though we slightly over-extend the margin, there will be no ill results. Fig. 11, B1. The muscle that functions at an approximate right angle to the denture margin occupies a position between these two extremes as regards the tendency to denture displacement and the possible development of soreness in the tissues. A consideration of the above facts will explain why it is that Lateral Throat

Form flanges in the lower denture are possible even though we carry the margin of the flange beyond the insertion of the Superior Constrictor muscle. Fig. 11B

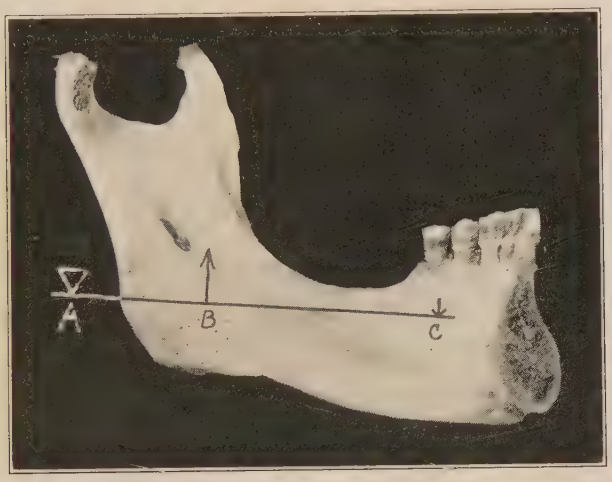

FIG. 10x.

(1). Many men have attempted the use of this flange in their lower dentures with only a meager information as to how it should be done. This can only result in failure. One must study this text carefully and follow the technic as laid down herein if he is to attain any degree of success worth while.

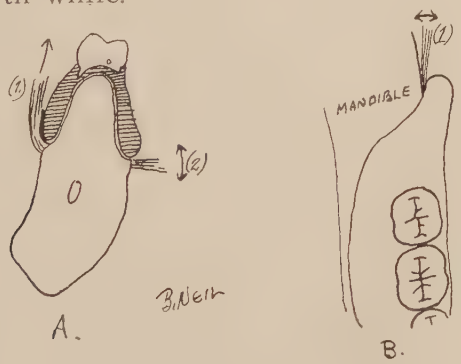

FIG. 11—MUSCLE ANGULATION
A, 1, Acute Angle; A, 2, Right Angle;
B, 1, Obtuse Angle.

CHAPTER II

Oral Anatomy as Related to Denture Practice

This chapter will not attempt to go into a minute description of the anatomy of all oral tissues but will give such of it as directly concerns the prosthodontist in his effort to render the best possible full denture service. One of the outstanding reasons why so large a percentage of men are dissatisfied with their end results in denture practice is their lack of an intimate knowledge of the anatomy of the parts involved and their failure to appreciate the functional requirements of the tongue and adjacent tissues. Most of us have known this anatomy as we have found it in the cadaver with all of the tissues lying dormant and devoid of the vigor which is characteristic in the living subject. Living tissue in function offers quite a different study. Most muscles have a rigid point of origin as well as a rigid point of insertion as in the Occipito-Frontalis with a functional range that is practically nil, or as in the biceps which has an increased functional range over the Occipito-Frontalis. We have in the tongue and adjacent areas a group of muscles which possess functional activities which are peculiar to this group and found nowhere else in the body. The tongue muscles are divided into two groups, viz., the intrinsic and the extrinsic. The intrinsic muscles are those that have both their origin and insertion within the tongue. These muscles have the ability to lengthen or shorten their fibres to conform to a change of environment and thus change the size and form of the tongue. (See chapter on classification.) The extrinsic muscles of the tongue are those that have their origin outside the tongue and their insertion within the

tongue. All of these with the exception of the Palato-glossus have a bony origin. The Palato-glossus muscle is an extrinsic muscle of the tongue that has its origin within the soft palate and its insertion in the side and base of the tongue. Fig. 12AA. Not even the mucous covering of this muscle comes into contact with either denture and yet it is a muscle that has a considerable influence over the functional range of certain border tissues. This muscle forms the Glosso-Palatine Arch or commonly referred to as the anterior pillar of the tonsil. The mucous membrane covering this muscle passes downward at the side of the tongue and then outward in the floor of the mouth to cover the fibres of the Mylo-Hyoid muscle and then into the side of the mandible at the gingivae. In the extreme distal of the mouth this mucosa passes backward and outward in a concave surface to cover the lateral throat form area and passes over the retro-molar pad to be continuous with the buccal mucosa. This mucous membrane is a border tissue to the mandibular denture. Fig. 4, A1. In the floor of the mouth in the molar area it covers the Mylo-Hyoid muscle and this muscle is therefore a border tissue at this point. Fig. 13 (6). This mucosa distal to the retro-molar pad has no muscle fibres beneath it but is influenced in its functional range by the Palato-glossus muscle, which comes out of the soft palate to be inserted into the side and base of the tongue. Fig. 12A. The movement of the tongue forward as in moistening the lips will pull the Palato-glossus forward, which in turn will pull forward the mucosa of the lateral throat form area. (See chapter on classification.)

We have another group of muscles which have two bellies or sections separated by an attachment to a

movable bone, the Hyoid. The Diagastric and the Mylo-Hyoid are examples of this group. Of these the Mylo-Hyoid concerns us greatly. It forms a large part of the floor of the mouth and is a border tissue to the lower den-

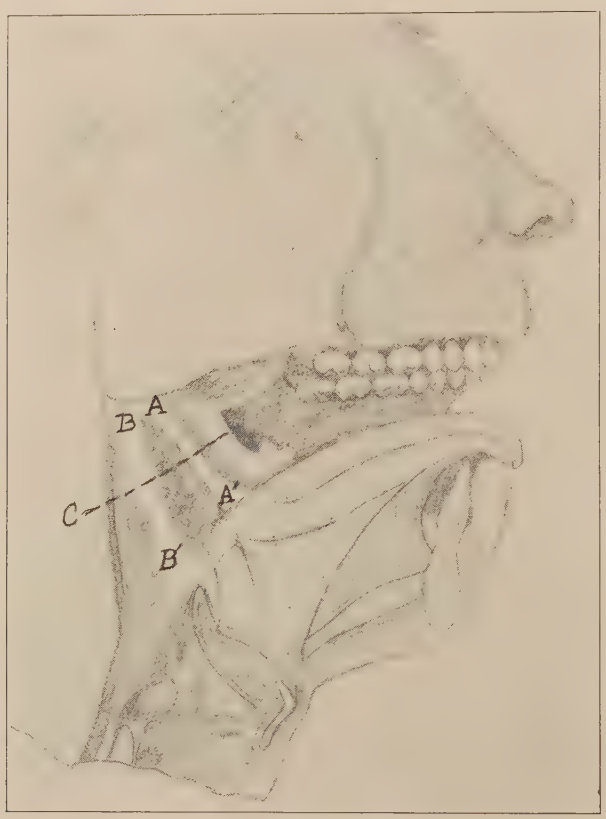

FIG. 12.
A, A, Palato-Glossus Muscle; B, B, Palato-Pharyngeal; C, Internal Oblique Line.

ture between the second bicuspid backward to the distal of the last molar. Fig. 14; 5. The two Mylo-Hyoids have their origin in the Mylo-Hyoid Ridge which extends downward and forward to the symphesis. At the second bicuspid position the muscle drops to a lower level and

passes under the sub-lingual glands (Fig. 14; 4) and cease to be a border tissue at this point. Fig. 14 (5). These two muscles pass downward medially and forward and present two forms of insertion. The posterior fibres are inserted into the body of the Hyoid Bone and the remaining fibres are inserted into a median raphe under the tongue which extends between the Hyoid bone

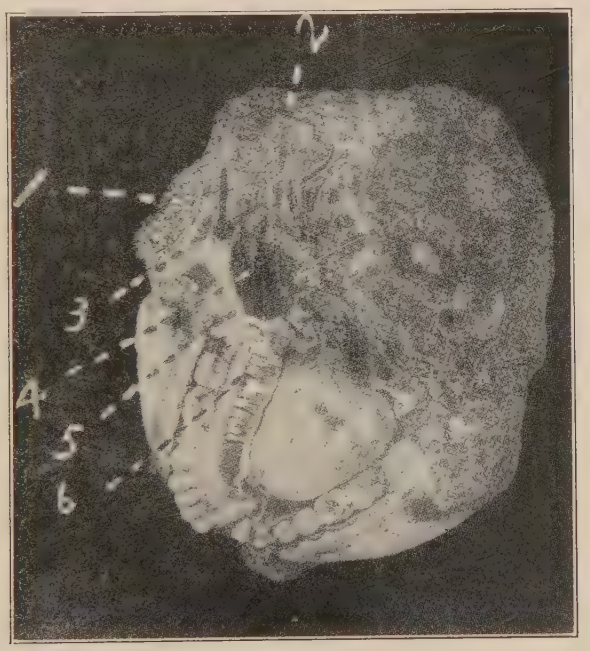

Fig. 13.
1, Ext. Pterygoid; 2, Int. Pterygoid; 3, Mandibular Nerve; 4, Lingual Nerve; 5, Lateral Throat Form Area; 6, Mylo-Hyoid M.

and the symphysis. This muscle is not inserted into the tongue but is influenced in its function by the tongue in the following way: Having an insertion in the Hyoid bone its distal fibres are raised by the protruding tongue due to the lifting effect of the

Hyo-glossus muscle. Thus we find the distal fibres of the Mylo-Hyoid rising and falling in function with the tongue like the wings of a bird in flight. These distal fibres of the Mylo-Hyoid are attached at a higher point in the mandible than any other border tissue. Fig. 14 (6). This group of muscles receive nerve supply from the motor branch of the Fifth Cranial Nerve and therefore have a co-ordinate movement. In function the tongue presides over and controls the functional activity of all the adjacent tissues. It is therefore important that the operator understand fully the functional requirements of the tongue which will lead him to understand and appreciate the functional requirements of those tissues which function as border tissues to the lower denture. It was on a basis of this understanding that led the author to work out a classification of Lateral Throat Form as one phase of mouth study leading up to a correct diagnosis of mouth conditions. The designing of the base plate for the lower case as described in Chapter IV is based upon the research done along this line.

When a patient's mouth is opened to its greatest extent one may notice a cord-like tissue which is very taut and passing up from the base of the retro-molar pad to a point distal to the maxilliary tuberosity. This is the Pterygo-Mandibular Ligament. Fig. 14, 7. This ligament is attached to the inner surface of the internal oblique line of the retro-molar triangle at the base of the retro-molar pad and its upper extremity is attached to the tip of the Hamulus which is the end of the internal Pterygoid plate. Fig. 14 (1). This ligament is spoken of by some authors as the Pterygo-Mandibular Raphe. It is in fact a raphe that separates the fibres of the Buccinator muscle from the fibres of the Superior Constrictor

muscle. With the use of the technic as described in this volume the Superior Constrictor muscles becomes a border tissue to the lower denture. At a point where the denture margin passes over the retro-molar pad and begins to pass backward into the lateral throat form area it is functioning with the lower fibres of the Superior Constrictor muscle as a border tissue. Fig. 14 (9). This muscle is inserted into the distal edge of this

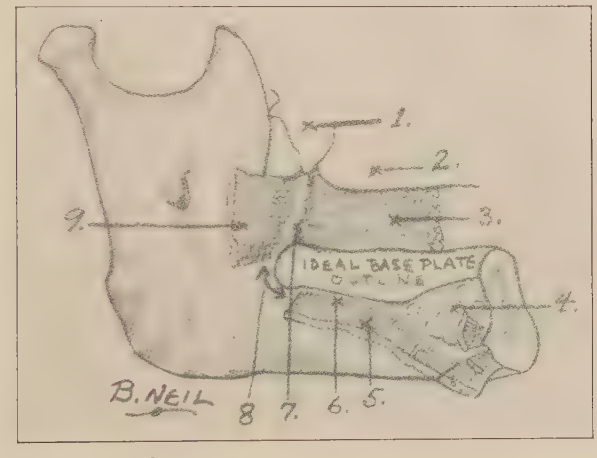

FIG. 14.

1, Int. Pterygoid Plate; 2, Max. Tuberosity; 3, Buccinator M.; 4, Sublingual Gland; 5, Mylo-Hyoid M.; 6, Straight edge of denture margin; 7, Pterygoid-Mandib. Raphe; 8, Area devoid of muscle insertion; 9, Sup. Constrictor M.

Pterygo-Mandibular Raphe and passes backward and slightly inward to function almost parallel with the inner surface of the denture. This parallel or obtuse angle angulation makes it possible for us to carry the denture margin over the insertion of these fibres without any danger of interference with their function. Fig. 11B. It is exceptionally rare that any soreness is developed here. Occasionally a few of the lowest fibres of the Su-

perior Constrictor muscle will be attached below the end of the raphe and when this occurs it will be noticed in the primary lower impression in the form of a V-like depression.

The Buccinator is not classed as a muscle of mastication although it may be classed with the tongue as an auxiliary muscle of mastication for the reason that these

FIG. 15.
1, Buccinator M; 2, Masseter M.

two keep the food in position upon the teeth during mastication. The Buccinator, Figs. 14, (3); 9, (5); 15, (1) arises from the alveolar border of the maxilla in the region of the molar teeth. From below it arises from the base of the alveolar border of the mandible in the region of the molar teeth. Some of these fibres both from the maxilla and mandible pass posteriorily to be inserted into the Pterygo-Mandibular Raphe, (Fig. 14, 7) which forms a bond of union between the Buccinator and the Superior Constrictor. Anteriorily the fibres

of the Buccinator converge toward the corner of the mouth where they blend with the Orbicularis Oris muscle of which they form a part. The external oblique ridge of the body of the mandible in the molar area is our landmark for locating the buccal margin of our denture as the Buccinator is inserted into the alveolar process just inside of this ridge.

The author has been at a loss to understand why so many dentists will build their mandibular dentures so short antero-posteriorly. During the past ten years he has observed several thousand mandibular dentures made by as many operators. It is safe to say that more than ninety per cent of these extended no farther toward the distal than the apex of the retro-molar pad, thus falling short of the required length by fully three-fourths of an inch. An examination of the mouth of any living subject will reveal that the insertion of the buccinator (Buccal border tissue to the mandibular denture) gradually passes backward and inward to the mandibular raphe, which raphe is inserted into the extreme base of the retro-molar pad. This retro-molar pad offers a fine resilient area for the periphery of the denture to rest upon at this point and yet a majority of men fail to utilize it. See Fig. 16.

Line B, on Fig. 16, shows the correct point where the denture margin should cross the Retro-Molar Pad A. Line C, is the point where the distal edge of the average denture is placed and is a serious error.

The Buccinator muscle fibres function at an acute angle angulation to the denture margin and this type of an angulation is most likely to dislodge the denture in case of an over-extended margin. Fig. 11. This is most likely where the over-extension is at the point where these

fibres converge into a tendon-like attachment opposite the bicuspids. In the anterior portion of the mouth there are no muscles that act as direct border tissues. We must, however, consider the indirect action of such muscles as the Orbicularis Oris, Levator Anguli Oris, Triangularis, Zygomaticus, Risorius and the Quadratus Labi

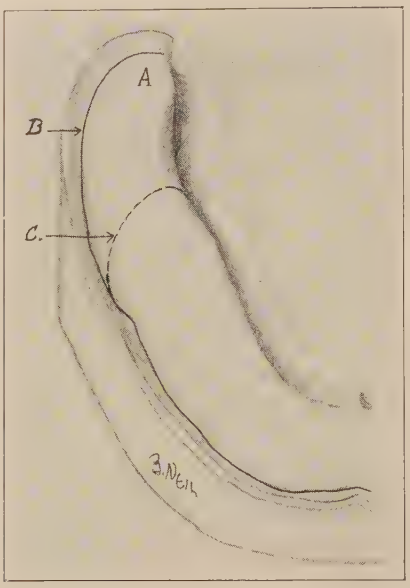

FIG. 16.
A, Retro-Molar Pad; B, Correct denture outline;
C, Incorrect denture outline.

Inferiorious. The Orbicularis Oris constitutes the greatest bulk of the lips and it has no bony attachment. The others of this group have a bony origin and an insertion into the lips. While these muscles do not function around the margin of the denture they act indirectly to dislodge a denture because of their extreme mobility. This is especially true when the patient presents a high tissue tone. When the function of these

muscles are impaired through the loss of or the wearing down of the teeth it will be found that their fibres are shortened and become more or less taut. This brings about quite a change in facial expression. Do not attempt to restore this lost expression by building out with plumpers from within. The only recourse is to reestablish the lost function by replacing teeth of proper length and thus put these muscles to work again in a normal way.

The Palate

In studying the palate we gain a wealth of information that will make it possible for us to develop and use a standardized technic applicable to all cases in the matter of a definite length of the denture, definite pressure in postdamming and of a very definite rule for placing the margin of the case.

The tensor palati muscle is another border tissue that has been somewhat neglected. It functions as a border tissue to the maxilliary denture at an obtuse angle angulation. Because of this angulation it may be impinged upon as in the case of the superior constrictor by the mandibular denture but in both instances these tissues must be slightly displaced if the case is to be comfortable, otherwise a tickling sensation will result in gagging.

The tensor palati comes under the class of the two-bellied muscles. It arises from the scaphid fossa at the root of the medial pterygoid lamina, from the posterior border of the lower surface of the great wing of the sphenoid, from the spine of the sphenoid and from the lateral aspect of the Eustachian Tube. It descends to the lower end of the pterygoid lamina and ends in a tendon which turns horizontally, under the Hamulus

into the soft palate to be inserted into the distal edge of the horizontal plate of the palate bone. Its functional range is slight and this fact together with its obtuse angle angulation makes it entirely feasible to extend the denture base upon it slightly. This is especially so in the Class 1 and 2 throat forms.

FIG. 17—THROAT FORM.
1, Class one; 2, Class two; 3, Class three.

As stated in the chapter on classification we study this soft palate in function. Have the patient close the throat as in making a gutteral sound and blow while the operator holds the patient's nostrils. The air passing above the palate will force it downward. The author does not recommend this method though it is used by some of the best prosthodontists. This puts the palate into a forced position rather than a functioning position.

By having the patient say Ah, we see the palate raised by the normal action of the levator palati, and it is this normal function that we wish to build to. The anterior edge of this mobile portion of the palate lies anterior to the distal edge of the horizontal plate of the palate bone. There is in practically every case sufficient resilient tissue for postdam between this mobile tissue and the distal edge of the hard center of the palate. Fig. 17. This test of the moving palate is used by all dentists using all technics for determining the distal position of the denture margin in this part of the palate. The author has for twenty years had a definite rule to determine just where the denture should cross distal to the tuberosity. This is to locate the Pterygo-Maxillary Notch which is formed by the proximity of the Internal Pterygoid Plate to the distal of the Maxillary Tuberosity. This notch is just one-eighth inch wide and is as uniformly placed as are any other anatomical landmarks to be found. This notch is filled with very resilient tissue and is the only place distal to the tuberosity that pressure can be applied in postdamming. Fig. 14; Fig 18D.

Blood Supply

No denture can be long lived that is not built with the thought of providing for an uninterrupted circulation under same. It is not enough for the dentist to be able to locate the foramina and name the bloodvessels that enter same. He must understand the resilient nature of the tissues that cover these bloodvessels. Any man who is at all familiar with block anaesthesia technic will remember the very dense nature of the tissues that lie over the incisive foramen while we encounter an extremely resilient area over the posterior palatine foramen. Both of these foramina accommodate arteries that enter the

palate and which are necessary for the proper nutrition of these tissues. The slightest pressure by the denture over the incisive foramen will blanch the tissue and interfere with blood flow. Also a pressure here will produce an irritation of the naso-palatine nerve which brings about considerable discomfort to the patient. This

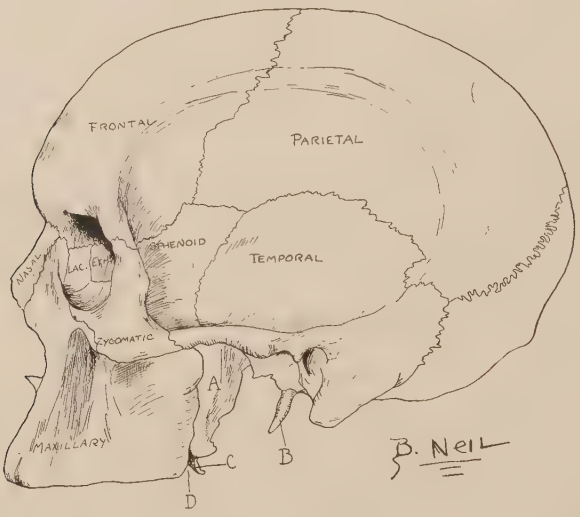

FIG. 18.
A, Ext. Pterygoid Plate; B, Styloid Process; C, Hamulus; D, Pterygo-Max. Notch.

foramen should always be included within the relief area. Fig. 21D. The reverse is true with regard to the posterior palatine foramen. Here we have considerable resilient tissue with the artery lying deep. Fig. 25A. This condition makes it not only permissible to postdam over this foramen but unless it is done the denture is likely to be disappointing from a standpoint of retention. These foremina lie just under sections two and four of the postdam line and their treatment is described in Chapter III on postdamming.

Another anatomical landmark which has been overlooked and which is constant in its location is the palatine spinous process. There are three or four of these placed on both sides of the palate. They are protruding into the palate from the horizontal plate of the maxilla just

anterior to the posterior palatine foramen. In the very deep V-shaped vaults they are not so noticeable but in the broad, flat arches they demand definite attention. They must not receive masticating pressure if the patient is to have the maximum of comfort with the dentures. The treatment of these are referred to in Chapter III.

CHAPTER III

AUTHOR'S NOTE: Many men have undertaken the execution of this technic without a thorough knowledge of the functional requirement of the tissues involved, only to meet with failure. The men who are successful are those who have first mastered the anatomy. Do not invite almost certain failure by attempting a case before you have read this book many times.

THE UPPER IMPRESSION

Before taking an impression of any kind one should first make a complete survey and classification of all conditions to be encountered. One should not have an impression material to which he is wedded and holding to same as the material par excellence. One may have a favorite material and technic to be used in all average cases but there are times when tissue conditions are such as to demand a definite deviation from the average procedure.

The writer is convinced that the impression technic described in this text will give the best results in the average case in the hands of the general practitioner but it must not be understood that he recommends it for all cases. The Class 3 tissue resiliency which presents the flabby and spongy ridge cannot be successfully handled with this technic. One cannot take a plaster wash when this condition is present and should therefore use the all-compound technic. An all-plaster impression is contraindicated for the Class 3 tissue resiliency. Such an impression would give a cast with these tissues at rest. A denture built upon a cast taken from this impression would have very poor stability as it would move with the tissues.

Regardless of the technic used, certain definite end-results must be attained if the patient is to derive the greatest comfort and efficiency from the dentures. The word FUNCTION should be kept ever in mind. The

dentures must function as intended and the individual tissues involved must not have their function interfered with by the denture. The greatest comfort comes to the patient when the function of all tissues involved is provided for. With reference to the denture margins it must be stated that they must never be extended to a point where they will interfere with the functional requirements of the border tissues and at the same time it must be remembered that discomfort and inefficiency will result if these margins fall short of extension to that point necessary to fill the denture space. The technic herein explained makes provision in a very definite way for this condition and if the technic is followed, uniform end-results are certain to follow. As regards the maintenance of the circulation, this technic very definitely provides for that. As regards the ability of the various tissues to withstand stress in mastication, this technic makes ample provision for that. This upper impression technic was developed in Meharry Dental College more than twenty years ago while the author held the chair of Prosthetic Dentistry in that school. Every other technic has been given a fair trial during that time and the author is convinced now that this technic offers the general practitioner the greatest degree of success.

This is a compound impression with a plaster wash. The compound is used for its physical property of displacing tissue and the plaster wash is used for its physical property of preventing tissue displacement. The writer recalls a technic which was formerly well recommended and referred to as a compound impression with a plaster wash. He took a postgraduate course in this and was told that if the compound was visible through the plaster that same should be discarded as a poor im-

pression. If this was true, then a correct impression after the technic was nothing more than a plaster impression using a compound tray. The technic herein described requires that the compound must be visible over the stress-bearing area but it must not be visible over the non-stress-bearing area, thus taking advantage of the physical properties of these two materials.

The Impression Tray

Four points for consideration are presented in the selection of the upper impression tray, viz., breadth, length, height of the flange and the contour of the dis-

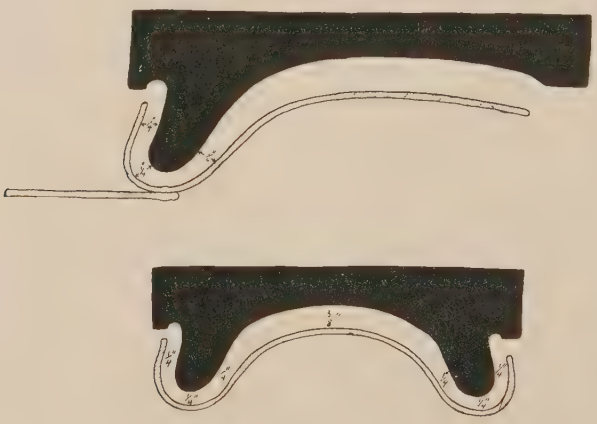

FIG. 19.

tal edge of the tray. The author uses an ordinary britannia metal or stamped aluminum tray. The distal edge of the tray is placed over the Pterygo-Maxillary notch (Fig. 18, D) and the handle of the tray is raised bringing the labial flange into position. The length of the tray must be such that with the distal edge of the tray over this notch, the labial flange of the tray must clear the

labial ridge one-fourth of an inch. Lower the handle of the tray and with the distal edge of the tray still over the notch, observe the width of the tray in the distal. There must be one-fourth inch of space between the buccal flange of the tray and the tuberosity. In other words, the tray must be of such a size as to take an impression one-fourth inch thick at all points. The height of the flange must not unduly distend the tissues. The distal edge of the tray, which usually curves upward toward the tissues, must be bent in the opposite direction so that the distal edge of the tray is at least on a level with the floor of the tray. It may be curved downward. This is to insure that the impression will be a minimum of one-fourth inch at its distal edge. Fig. 19 shows the relative size of the tray to the arch. Note that the distal edge of the tray does not curve upward toward the tissues. Note that there is a space of one-fourth inch for the accommodation of the compound with an increased space in the vault and across the distal.

The Modeling Compound

The author has used all makes of compound but prefers a brittle compound with a high resinous content that will chill rapidly and possess great rigidity after chilling. This rigidity and brittleness insures against change of form under stress.

Heating the Compound

The compound should not be over-heated. This is one of the most common errors by a large number of men. A majority of operators put a piece of paper in the bottom of a saucepan and drop the compound in the hot water. This is a mistake. Once you start softening compound it should never leave your fingers until it is

ready for the tray. This thing of going off to answer the phone while the compound is left in the hot water is a mistake. Do one thing at a time and do that thing well. If you are manipulating compound you have no time for the phone nor for book agents. If your assistant is trained in this work, well and good, but if she is softening compound for you and has brought it to the proper consistency for use, you should be there ready to use it. Compound has the quality of displacing tissue and is used in this technic for that purpose. To accomplish this purpose effectually, its consistency at the time it is carried against the tissues must be under the control of the operator. The author has the water heated to about 200 degrees Fahrenheit, but he never drops the compound in this hot water. Dip the compound into this hot water for a few seconds and remove. Grasp the part just inserted and insert the other side, repeating this and all the while kneading the material. This process of kneading will force the softened surface to one side and bring the hard center to the surface. This is continued until we have a uniform mass which is the consistency of very, very heavy putty. Do not heat the tray nor apply any lubricant to prevent sticking. This is wholly unnecessary. The presence of a lubricant will interfere materially with the working quality of the compound. The compound placed in the cold tray will insure its easy removal and will keep the trays clean. The excess is bent over the edge of the tray to hold same in position.

Carrying to Position

In the first insertion of the material the operator should have but one purpose in mind, and that is to center the tray in the mouth, getting an approximate im-

pression with flanges that have a minimum thickness of one-fourth inch. This one-fourth inch thickness must also be attained across the distal. If the compound is as soft as used by the average man it will be found in most instances that he has forced the tray too close to the tissues thus procuring an impression that is too thin. The heavy, stiff compound is the remedy for this error. Each step in this technic has back of it a very definite purpose to be accomplished and this purpose must be attained before going forward to the next step as the succeeding steps depend upon the proper execution of each preceding step. The tray is therefore centered upon the arch and pressure is directed upward and backward being careful to stop this pressure before too much compound is displaced. The operator should raise the patient's lip as the tray is inserted that he may observe the labial flange of the tray as it passes into position. As this pressure is to be an upward and backward pressure and as the labial flange of compound is to be one-fourth inch thick, the tray should be started to position at least three-eighths of an inch anterior to the labial tissues. This extra one-eighth inch will allow for the backward pressure in carrying to position. This upward and backward pressure with a stiff compound is necessary to control the placable tissue found upon the labial surface of the average ridge. Patients may sometimes complain that their upper denture feels loose under the lip. A failure to properly place this tissue and secure proper adaptation here is the cause of this complaint. When this compound has been chilled and removed it is examined for defects. The ideal result in this step should be a fairly accurate impression of the arch with no undue distension of the border tissues. The labial and buccal flanges should be a

minimum of one-fourth inch thick and the impression across its distal edge should be one-fourth inch thick. Minor wrinkles in the center which is the non-stress bearing area should be ignored if the impression is otherwise acceptable, as this area is to be cut away later.

The Second Insertion

The second insertion is for the very definite purpose of securing a very definite pressure over the ridges or stress-bearing areas. The compound is of course thoroughly chilled and with the use of a mouth blowpipe on the alcohol lamp we heat the entire surface of the impression to a depth of one millimeter. A bowl of tempering water has been prepared and this water should not be hotter than 120 degrees Fahrenheit. After heating the surface with the blowpipe the impression is dipped into this tempering water for about five seconds. The case is now carried to the mouth, the operator holding the thumb at the median line with the first and second fingers over the ridge at the first molar position. The operator should stand to the right of the chair and well toward the foot rest, facing the patient. He should now apply approximately twenty pounds upward and backward toward the temples and maintain this pressure about ten seconds. The author cannot stress too greatly the importance of the operator's stance during this step. Operators who persist in standing to the right and to the rear of the patient while performing this step will surely fall short of desired results. This pressure exerted in this step must be equalized. When the operator stands behind the patient he will be pulling instead of pushing the impression. This pull will naturally be toward his body, resulting in a lateral stress upon the ridges which will cause trouble. The author does not use cold water

in the mouth for two reasons. It is not necessary when using this brittle compound and the constant chilling of the tissues while taking an impression depletes them of their normal blood flow which certainly does them no good. This compound has the property of cooling under ordinary temperatures and with reasonable care it may be removed without distortion. We should now have a perfect imprint of the ridge or stress-bearing area with the buccal and labial spaces just comfortably filled with compound. Small wrinkles in the center of the impression may be ignored as this is cut away and taken in plaster.

The Third Step

The tray has now served its purpose. The overhanging excess of compound is trimmed away and the impression removed from the tray. The buccal and labial margins are trimmed down to their approximately correct height as shown by the rest position of the mucous fold of the case in hand. The outer buccal and labial surfaces are trimmed so that they slant inward toward the crest of the ridge. In cases presenting ridges that are sometimes very prominent at the cuspid eminences, care must be taken that this slanting arrangement of these outer surfaces does not produce thin places at these bulging points. Note this and if such a condition exists, thicken this point by adding compound with dry heat. After trimming these surfaces they must positively be a minimum of one-eighth inch in thickness.

The excess at the distal is cut away and we have a positive guide as to where this should be cut. It will be noted that the distal end of the buccal flanges terminate in a little point or ridge of compound which is formed by the compound in its attempt to enter the buccal side of

the Spheno-Maxillary notch. This little ridge of compound marks positively the location of this notch. A scratched mark is placed on this point and a similar scratch is placed upon the opposite side. These two points are connected with a scratched line that has a characteristic curve toward the anterior. The distal excess of compound is cut away so as to leave one-eighth inch of compound distal to this line. After cutting away this distal excess, note the thickness at this point which must be a minimum of one-fourth inch at all points on this distal margin. If it is thinner than this at any point it is thickened up as follows. Soften a sufficient amount of compound in hot water and then pass this through the flame. Pass the distal edge of the impression through the flame and then attach this piece to this surface and press same in position with the fingers. While still warm, carry to position in the mouth to correct any possible chance of having changed the form of the impression at this point.

The Fourth Step

We are now ready to form the labial and buccal peripheral margins of the compound portion of the impression. We have here a very definite end result to attain and that is to overtrim these margins so that when they are inserted, they will fall at least two millimeters below the rest position of the mucous fold. It must be remembered again that no denture margin must extend to a point where it will interfere with the functional range of the border tissues and at the same time this margin must not fail to fill the denture space. If this technic is followed literally, there will be no chance of an overextension and the margin of the finished denture will be in contact with the border tissues when functioning at

their neutral position. The elasticity of living tissue will allow them to function below this neutral position without dislodging the denture. These margins are trimmed in three sections, viz., the right buccal, the left buccal and the labial section. The alcohol flame is played along the outer or cut surface of the right buccal flange, being careful to keep the flame moving so as to avoid scorching the compound. The last movement of

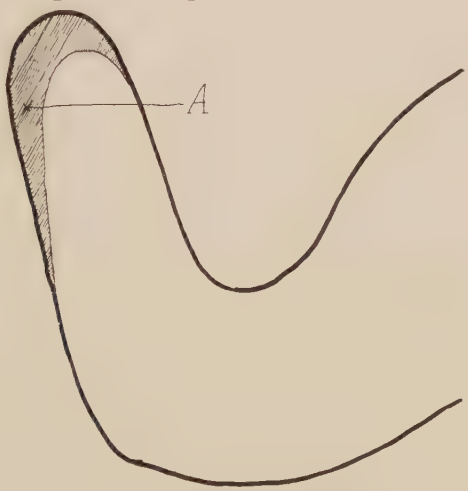

FIG. 20.
A, Showing depth to which margin of compound is heated for muscle trim.

the flame is along the extreme edge and about three millimeters inside of this margin. This should be heated to an average depth of about one and a half millimeters. Fig. 20A will show the depth to which it is heated. It will be noted that the greatest depth of heating is over the margin and this gradually tapers to a point near the occlusal. The impression is now dipped in the tempering water (not hotter than 120 degrees F.) and carried to position in the mouth. The operator should stand to the right and behind the patient. The impression is held firmly in position under and upward and backward pres-

sure of about twenty pounds with the left hand. The left arm passes over the patient's head. The operator grasps the buccal tissues with the right hand and moves them in an anterior-posterior position several times, after which the tissues distal to the corner of the mouth are forced in over the occlusal of the impression as far as is possible without undue discomfort to the patient. This places the buccal tissues under tension and pulls them farther than the patient can ever pull them by voluntary muscle action. This action will pull the warmed excess at the margin down upon the outer buccal surface where it is seen as an excess.

Under no circumstances must this pressure be applied to the cheek over the margin of the impression. The impression is now removed and dipped in cold water, after which it is examined carefully. Note the excess that has been pulled over the buccal margin and note especially where the excess has escaped toward the distal. Here it will pile up and thicken into a more or less flattened mass at the extreme distal end of the buccal flange as this is the easiest point of escape. This excess is all removed with a sharp knife and the heating and forced tissue trimming process is repeated. The author always uses three heatings and trimmings for each of these sections. To attempt to accomplish this purpose in a fewer number of heatings and trimmings is to run the risk of over-heating and the collapsing of the flange which will invite failure. In forced trimming of the buccal flange there are two points to keep in mind, each of which should receive especial attention. These are the buccal fraenum and the buccal mucosa under the malar process. The tissues under the malar process have a limited range of movement and really

should be pulled down more vigorously than the tissues of the buccal insertion.

The left buccal section is completed in the same manner. The labial section is heated in the same manner as the buccal sections but there is a difference in which the labial tissues are manipulated. Holding the impression firmly and under a definite pressure with the right hand, the left hand is used to pull the left corner of the mouth downward and forward. The hands are immediately reversed and while the left hand holds the impression in position, the right hand pulls the right corner of the mouth downward and forward. The full length of the right index finger is now placed across the lip just above the vermillion border and the lip is carried over the crest of the ridge, thus placing the labial mucous fold under tension and thus displacing the excess from the labial margin. This excess is trimmed away and this step is repeated until there is no longer an excess. We are now ready to pass judgment on the height of the buccal and labial margins of compound before taking the plaster wash. Pump the chair up to a point where the patient's mouth is on a level with the operator's face. Seat the impression and stand in front of the chair facing the patient. Grasp the upper lip, raise it and pull it forward and downward, noting the relationship between the mucous fold and the margin of the impression. The margins of the impression at all points must fall at least two millimeters short of contact with the mucous fold at its neutral position. This is to insure positively against an over-extension of these margins in the finished case. This space is filled with plaster in the next step and we thus procure an impression of these border tissues at their neutral or rest position.

The Fifth Step

This step in the technic involves the taking of a plaster wash. Before this is done the compound is so trimmed as to positively remove all pressure from non-stress-bearing areas and from the tissues that are later to be postdammed. Instead of postdamming at this time, we are to remove all pressure from these tissues, allowing them to fall to a position of absolute rest, securing an impression of them in plaster in this state.

It is not enough to release the pressure from the center of the palate but the palatal spinous processes which lie in the lateral of the palate in the molar area must also

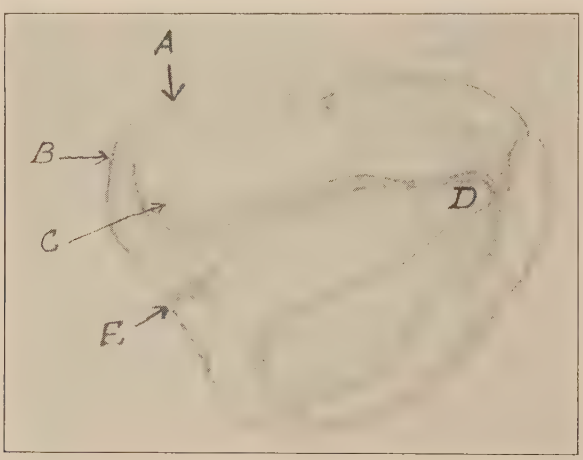

FIG. 21.

A, Height of buccal margin; B, Extent of cut surface halfway between A and C; C, Crest of ridge; D, Compound cut away over Incisive Foramen; E, Showing wedge-shaped bevel at distal of impression.

be included in the relief or non-stress-bearing area. The anterior palatine foramen must also be included in this relief. The author uses a mouth mirror to locate these spines. The edge of the mirror is placed against the

palate and slipped along the tissue surface from the crest of the ridge toward the medial line until resistance is met. You will feel the mirror jump over these spines and the patient will wince under the pain. When these are located their position is noted upon the impression, making the mark just outside or toward the ridge from them. This puts them within the relief. Both sides are marked and these two marks are extended forward and connected so as to include the anterior palatine foramen. Fig. 21, D. The distal ends of these lines are carried backward and curved outward to terminate just inside and anterior to the distal end of the buccal flange. Fig. 21, B. The Pterygo-Maxillary notch must be distal to this line, and as the little ridge of compound marking the distal end of the buccal flange marks this notch, it follows that this line must terminate anterior to and inside of this ridge of compound. We are now ready to cut away the compound constituting all of this area. This is cut away to a depth of one-eighth inch at all points except the extreme distal edge of the impression, where it is cut away until there is a thin wedge-shaped edge to the impression. Fig. 21 will show the impression after this compound has been cut out. It will be noted that this is cut out across the distal edge to a point as far as halfway up from the crest of the tuberosity to the height of the buccal flange. The distal edge of this compound impression was originally a minimum of one-quarter inch thick. This compound had given us an upward displacement of the postdam tissues. By cutting away the compound to a wedge-shaped edge (Fig. 21, E) it will be found that these tissues are now in the clear at least one-eighth inch after pressure is applied to the ridges.

This will insure that our plaster wash will secure an impression of these tissues at the rest position with absolutely no pressure. It should be noted now that when this impression (at this stage) is placed in the mouth and pressure applied, there will be no tissue under a stress except the ridge tissues. All other tissues are at rest and therefore their impression is secured in this state of rest with the plaster wash.

The Sixth Step

We are now ready for the actual manipulation of the plaster. Preliminary to the taking of this wash, however, we are to make certain records upon the tissues with an indelible pencil. This record is to note the exact line across the mouth where the distal edge of the denture is to be placed, under which the postdam pressure is to be applied. This record is also to note the exact extent of the non-stress-bearing area. It will be found that the edge of a standard mouth mirror will fit snugly into the Pterygo-Maxillary notch. These notches are thus located and their centers are marked with an indelible mark. Fig. 18D. The patient is now told to say Ah, as the operator observes the point in the center of the palate that separates the moving from the fixed palate. A mark is made one millimeter anterior to the edge of the moving palate. An indelible line is drawn from this center mark in both directions and terminating in the center of the Pterygo-Maxillary notches. This indelible line, which will transfer to the plaster wash, marks the exact point where the distal edge of the denture is to rest. If the technic is literally followed thus far, there can be no mistake as to this point. The hard center of the palate, including the palatal spinous processes and the anterior palatine foramen, (Fig. 21, D) are to be included

within the non-stress-bearing area. This is outlined with the indelible pencil upon the mucosa. The patient is instructed to keep the mouth open, as a closure of the mouth will mar these indelible records.

The Seventh Step

Taking the plaster wash in this technic is an important step designed to accomplish the very definite purpose of securing an impression of certain tissues at their rest positions. This plaster mix must be so thin as to permit the perfect seating of the impression over the ridges, displacing all but a film of plaster in this area. This thin plaster will also allow the lip to drop to repose and thus secure an impression of the buccal and labial mucous fold at the neutral position. The operator must have this plaster absolutely under his control and to this end the author has perfected a definite formula for the mix with definite rules for mixing. To two ounces of distilled water we add seven level tablespoons of Kerr Plaster No. 2. This is stirred with a spatula until we have removed all lumps and therefore have a perfect mechanical mix. This plaster at this stage would be entirely too thin. We now lay aside the spatula and use the compound impression with which to continue the stirring, dipping the impression in and out of the plaster and noting the change in the consistency of the mix. Note the sound of the mix. It will pass from a watery sound to a sound as if stirring oil. When this oily sound is noted, dip the impression and note if all of the plaster can be poured from it. In pouring the plaster from the impression it should begin to have that definite creamy consistency before it should be carried to the mouth. Experience is the best teacher at this point.

The operator should stand in front of and slightly to the right of the chair, facing the patient who has been cautioned against any movement of the lips. They are told to sit in a perfectly relaxed position and under no circumstances must they swallow or move the lips. To do so will mean failure. If the patient should move the lips after the plaster has just started to set, we would secure an impression of the distal functioning position of the buccal fraenum when as a matter of fact we are striving to secure an impression of the buccal insertion at its neutral or rest position. The thumb is placed at the median line and the first and second fingers are placed over the first molar positions. A pressure of twenty pounds is exerted upward and backward toward the upper lobe of the ears. This pressure is maintained until the plaster sets, which will be less than two minutes.

Although the author has described the making of the indelible records before making the plaster mix it should be done as follows: After the plaster wash has been brought up to the point of a mechanical mix, it is set aside and the indelible markings are made. The patient is then told to keep the mouth open and the operator turns his attention to the further mixing of the wash. This keeps the patient in this strained position for the shortest time. If the patient presents a highly viscous saliva it is well to administer dilute hydrochloric acid. This may be administered three drops in a wine-glass of water three time daily, starting the day prior to the appointment. This will cut the saliva to its normal viscosity. If this has not been done, the mouth should be flushed out with cold water just before taking the wash, and just before making the indelible records. The presence of this highly viscous saliva makes it very

difficult to get a perfect indelible record. In removing this impression the author stands in front of and facing the patient. The index fingers are passed in the corners of the mouth and back into the buccal spaces, raising the lip and cheeks and manipulating them in all directions freely. This breaks up the union between the plaster margins and the mucosa. With a water syringe place a few drops of cold water over each buccal insertion. Now grasp the impression by placing the right thumb on the palatal side of the left ridge and the fingers on the buccal side. Do not pull down until you have moved the impression several times in an anterior-posterior direction. As this movement is continued, pull down slightly. When it is noticed that the impression has "turned loose" release your finger pressure from it and manipulate the lip and cheeks when the impression will usually fall of its own weight.

We now examine this impression for defects. The ideal impression will have no compound showing upon the margins at any point. The stress-bearing or seating

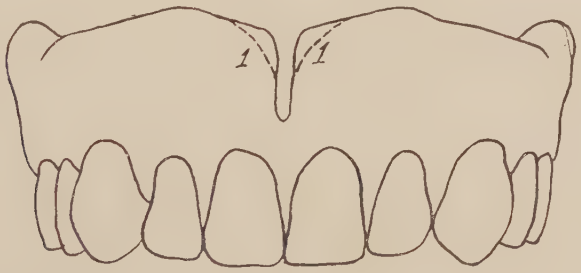

FIG. 22.

1, 1, Arbitrary rounding of right angle margins due to low fraenum insertion.

area will have only a film of plaster over it. This film should be so thin as to render visible the dark compound representing the stress-bearing area of the ridges. All

of that portion of the impression where compound was cut away should now be filled with plaster. Fig. 23. Air bubbles when not too large may be filled with wax. Quite often it will be found that the labial and buccal fraena have cut through the plaster, all other parts of the margin being perfect. This would not justify taking a new impression. These points can be relieved in the finished case. If the patient moved the lips it may be found that we have grooves in the margins made by the buccal tendons, these grooves pointing backward, and the plaster presenting sharp edges. This wash should be retaken.

FIG. 23.

It is sometimes found that we have a deep narrow slot in the margin made by the labial or buccal fraenum. This is ignored until the case is finished and the right angle margin so formed is trimmed as shown in Fig. 22 (1). In the all-compound impression technic it will be noted that the buccal tendon will trim the margin of the impression to both its anterior and posterior functioning position and destroying contact between tissue and impression at the neutral position. When a denture is being worn, contact between tissue and denture margin is had at the neutral position of the tissues during the greater part of the time. This seems to contra-indicate the use of such a technic as ideal. When we secure this impression with the buccal tendons and labial fraenum at the

neutral position and so construct the denture, we have contact betwen tissue and denture margin without tissue tension for the greatest period of time and when these tissues are called upon to function in either direction, there elasticity will allow this. Fig. 23 shows a lateral cross section of the upper impression. Note the film of plaster over the ridges with a roll of plaster at the margins, thus insuring against the possible over-extension of these margins. Note the heavy thickness of plaster over the center of the palate thus allowing a definite pressure over the ridges.

After noting carefully all points of the impression and it has been accepted as usable, we next cut a small groove one millimeter deep in the center of the postdam line and throughout its entire length. This grove will transfer to the cast as an embossed line. We next scrape plaster from the non-stress-bearing area to create a relief over these areas to compensate for the settling of the denture which always comes after the case begins to function. The tissues constituting the medial line in the palate represent the most dense tissues and the greatest relief is therefore made here. We therefore cut a groove through the median line from the anterior edge of this area to the distal edge. This groove should be at least two millimeters deep and represents the maximum amount of relief. Starting at the bottom of this groove we scrape the plaster out toward the periphery of the non-stress-bearing area, gradually coming out to a feather edge and blending this area into the margin of the stress-bearing area. An ovoid vulcanite scraper is the best instrument for this purpose. When there are convex ovoid-like surfaces in the center of the palate the scraping should be done so as to maintain these contours. We are now ready to pour the cast.

The Eighth Step

Boxing and pouring the cast is of more importance than is usually accorded it. It is very discouraging for an operator to go to so much trouble in producing a definite periphery on an impression to find that the technician has given him a cast that only partially copies this margin. This periphery is as much a part of the impression and cast as is any part of the ridge. A section of this periphery that is usually partially if not wholly lost in the boxing is the section distal and buccal to the tuberosity. This is caused by attaching the box too close to the impression, thus making no provision for a protective excess. To overcome this, a rope of wax at least one-eighth inch thick should be attached to the entire periphery of the impression, being careful to maintain its full thickness distal and buccal to the tuberosity. The distance that this rope is placed below the margin of the impression should be that distance represented by the thickness of the margin. If this rule is followed, the peripheral groove in the cast will have a depth just equal to its breadth at all points and outside of this groove will be the protective excess. A cast is poured into this impression.

The Ninth Step

This step involves the postdamming of the case which is accomplished by cutting a groove in the cast. If the technic thus far has been literally followed, the embossed line across the distal of the cast marks the exact point where the distal margin of the case should function, and also gives the exact place where the distal of the postdam pressure should be applied. The operator can rest assured that this denture will be in harmony with the functional requirements of the tissues against

which it is to function. This embossed line is divided into five sections by four pencil lines made parallel with the sagital plane. See Fig. 24. These sections of the postdam line are numbered from one to five beginning with the space distal to the right tuberosity. Upon examination of the mouth it will be found that the tissues

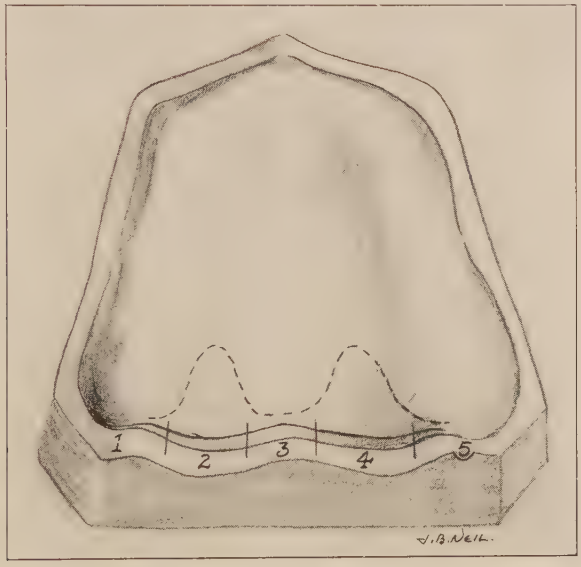

Fig. 24.

in these several areas differ in resiliency. These several areas are examined separately for their resiliency and the embossed line is replaced by a groove the depth of which is relative to the resiliency of the tissues in these several areas. The rule followed here is to note the total possible displacement of these tissues and then cut the groove to a depth equal to two-thirds of this displacement. Sections one and five are examined with the edge of the mouth mirror by placing the mirror in the Pterygo-Maxilliary notches. Fig. 18, D. It must be remembered that these tissues were absolutely at rest when the

plaster wash was taken and therefore the possible displacement of these tissues must be considered from the moment the mirror touches the mucosa until it can be forced no farther into the notch. The cutting of this groove to only two-thirds the possible displacement of these tissues allows for the permanent settling of the case in function. This method of post-damming cannot scientifically be used with any other impression technic. The groove in this cast is cut with a number ten round bur. The resiliency in sections two, three and four is best studied with a large ball burnisher. When this groove has been cut it will be noted that we have a groove of uniform width but varying in depth. The end of this groove is carried well around into the buccal fold, blending and gradually losing same in the extreme height of the buccal fold. As this groove is carried into the buccal fold, care must be taken to see that it is not carried on to the hard buccal surface of the tuberosity, but kept well out into the flexible tissue. The next point is to increase the width of this groove by scraping away its anterior edge. In sections one and five, the stress-bearing area extends well back on the tuberosity (Fig. 21, C) and the anterior edge of this groove must not be scraped far enough forward to include the edge of this area but just to blend to it. In section three we have the hard non-stress-bearing area extending backward to nearly approach the anterior edge of this groove and the scraping here of the anterior edge of the groove must be only far enough to blend these two.

In sections two and four we have the soft, resilient tissue that lies over the posterior palatine foramen in the lateral aspect of the palate. Note at A, Fig. 25, the thickness of this tissue as shown by this lateral cross

section. This soft tissue extends forward between the stress-bearing and the non-stress-bearing areas forming roughly a triangular area. Fig. 24. The postdam pressure is extended forward to include this area by scraping the cast from the bottom of the groove and blending forward to nothing.

We now have a cast which represents the ridges under pressure, and all points of the mucous fold at rest.

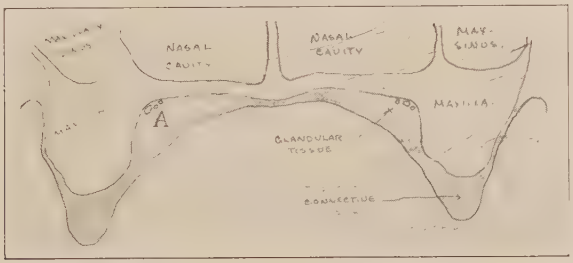

FIG. 25.

The tissues under postdam pressure are those tissues which we know are by virtue of their resiliency capable of withstanding this pressure without injury.

Criticism has been made of this postdamming procedure that too great an element of risk is involved. The author's answer to such citicism is that if this criticism is to be sustained we should never prepare another cavity for in so doing we encounter too great an element of risk or guesswork. There are no scentific instruments made to measure the depth of a cavity as it is being cut, but this procedure is scientific because it is based upon a thorough knowledge of dental anatomy. So, too, with this technic, it is scientific for it is based upon a thorough knowledge of mouth anatomy.

The Posterior Palatine foramen lies under sections two and four of the postdam line and the author applies

pressure here. It has only been a few years since the word went out from those advocating an all-compound technic that the reason that dentures built upon these impressions were short lived was due to too much pressure over these foramina. There began then an almost universal practice of placing a relief over these foramina but these dentures continued to be short-lived. The reason was not that the pressure was too great over these foramina, but it was too great at all points since the operator could not control this pressure. Many cases have been seen where repeated postdam with compound has resulted in producing permanent wide and deep grooves which have permanently damaged these mouths. Dentures postdammed after the technic described in this volume may be worn for years without showing the slightest trace of tissue displacement.

If one is at all familiar with block anaesthesia technic he will remember with what ease the syringe is emptied over the posterior palatine foramen and also the extreme depth of this tissue as compared to the difficulty of emptying the syringe of even a few drops of liquid over the anterior palatine foramen and the dense but thin tissues there. This explains why we relieve over the one and postdam over the other. Both foramina give entree to blood vessels but the difference in the resiliency of the enveloping tissues is the point to be considered. The author has attended many clinics where the all-compound impression was demonstrated. This impression was finished so far as the buccal and labial margins and the various surface adaptations were concerned, reserving the postdam for the last step. Compound was then heated and placed across the distal of the impression and carried to position under pressure. The impression was

tested for retention and pronounced o.k. No one will successfully deny that dentures in function will produce a certain tissue displacement, resulting in the settling of the entire case. This is very noticeable in partial cases. The question then arises, if the case was properly postdammed at the time the impression is made, does it not follow that it is over-postdammed after this settling has occurred? The technic herein described takes this settling into account and many cases seem to have poor retention at the time of delivery. The retention is noticeably improved as the case is worn, this improvement frequently being noted in a few hours. Some men who formerly practiced the plastic rope method of postdamming have abandoned it and are now using no postdam. This of course is preferable to an unscientific technic. It is the best of the two extremes.

Fig. 25 shows a lateral cross section of the maxilla through the posterior palatine foramina. Note the heavy glandular tissue over these foramina. The passing of a ball burnisher over these areas in the living subject will reveal a condition as though there might be fluid under the surface. This tissue which lies in sections two and four of the postdam line and extending forward from the edge of the denture space as shown at 2 and 4 in Fig. 24 should certainly be included within the area to be postdammed. A relief here is positively disastrous and to fail to postdam is certainly to invite failure.

The Tenth Step

The next step is to build a trial plate and test the postdam procedure. A baseplate of a rigid shellac material is carefully adapted to the cast. The baseplate is carried well over the crest of the ridge but is stopped short of the mucous fold. The distal edge is carried to the distal

of the cast so that we have an excess distal to the postdam groove. A rope of parafine wax is forced with thumb presure into the buccal and labial fold, completely filling same. With a hot spatula, this is attached to the baseplate. We now attach an occlusal rim and the whole is chilled thoroughly. The trial plate is carefully removed and the excess wax trimmed away from the buccal and labial. The distal of the baseplate is now passed through the flame but not overheated. Using a burnisher or heavy wax spatula this base is burnished into the postdam groove. Instead of cutting off this excess it is bent back and luted down with a hot spatula. This gives us a distal edge that can be smoothed and rounded and more nearly represents the distal edge of the finished case. This trial plate is now dipped in water and carried to the mouth and pressed firmly in position for testing the retention. If this is not satisfactory, there is one of two things to be corrected. Either the baseplate is not perfectly adapted or there is a leak in the postdam. Check the latter first. Dip the baseplate again in cold water and carry to place as the patient is instructed to keep the mouth open while the operator watches the distal edge of the trial plate for the escape of air bubbles. Pressure should be applied to the occlusal rims over the molar area. As air is under the baseplate it must escape as the base goes to position. It will naturally escape at the point of least resistance. If the case is properly postdammed this point of least resistance should be somewhere over the buccal or labial periphery. This mucous fold is under no pressure nor displacement, while the tissues under the distal of the trial plate are or should be definitely displaced according to their resiliency. Note where the air bubble escapes and then reseat the baseplate

several times to see if this bubble persists in appearing at the same place each time. Deepen the groove at the point where the air escaped, reheat and reburnish the baseplate and test again. When this leak has been stopped, the air will escape over the labial.

CHAPTER IV

The Primary Lower Impression

This impression was formerly referred to as a "snap" impression. The author has discouraged the use of this term and is now referring to it as the primary impression. It has its importance; certain phases of it are of paramount importance. The denture should not be finished upon a cast made from this impression. The object of this impression is to secure a cast upon which we may outline the ideal form for a baseplate and the master impression is taken later in the form of a rebase. The impression is taken with the black brittle compound and is the best possible imprint of the ridge with a slightly over-extended margin at all points, to which is added the Lateral Throat Form area.

By reference to Fig. 14 it will be seen that the lowest point that a denture margin can be carried in the mouth is just beneath the second bicuspid position and the shortest point on the denture margin should be at the highest point of the attachment of the Mylo-Hyoid Muscle which is under the distal cusp of the last molar. The muscle attachment between these two points is a straight line running upward and backward. When Dr. Bowen made his second tray as shown in Fig. 26B he corrected the angulation of his hinge but failed to correct the slant of the lingual margin. It will be seen that both trays A and B have a horizontal lingual flange which is entirely too short.

Fig. 26C shows an ordinary tray as used by the author after having been trimmed to the required contour. This contour shows a straight and oblique distal

edge which lies approximately over the internal oblique line of the Retro-Molar Triangle. Fig. 26, D. The longest point on the lingual flange is below the bicuspids and the shortest point is under the last molar.

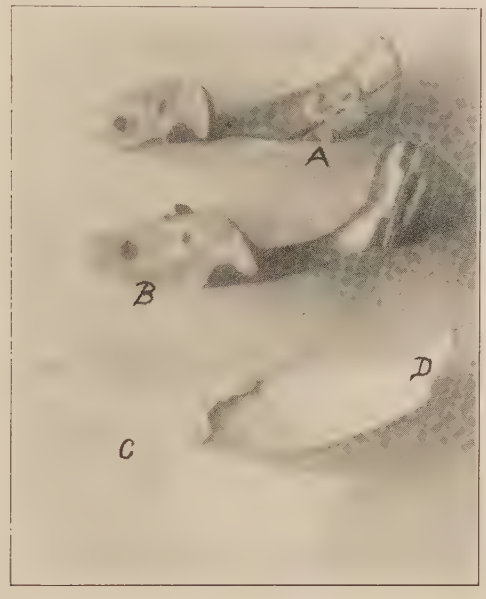

Fig. 26.

Fig. 27 will show how the author uses the first joint of the index finger to do the work of the hinge on the Bowen tray.

Selecting the Tray

For about two years the author used the hinged trays patented by the late Dr. B. K. Bowen. Fig. 26A is the tray used by Dr. Bowen before any dissecting was done. It will be seen that the hinge of this tray was designed to displace the floor of the mouth in an effort to place the denture margin beneath the Mylo-Hyoid Ridge. Fig. 26B is the tray designed by him following the dissections

at Vanderbilt University. Note that the flange is now hinged at an angle of about forty-five degrees to the occlusal and is designed not to displace the floor of the mouth but to displace those tissues which lie distal to and below the internal oblique line of the Retro-Molar Triangle. (The Lateral Throat Form area.) As above stated, the author discarded the use of these trays, feeling that he could do better work by trimming an ordinary tray, Fig. 26C, and using the first joint of the index finger in lieu of the hinged flange, Fig. 27.

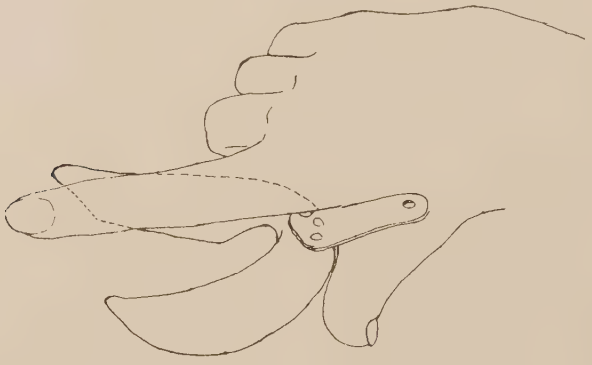

FIG. 27.
Relation of index finger to tray in taking Lateral Throat Form section of Primary Impression.

The Retro-Molar Pad is the definite anatomical landmark to determine the length of the tray for a given case. When the tray covers the anterior portion of the ridge, the distal end of the tray should cross the ridge so as to cover nearly all of this pad. Fig. 16A. If the tray covers all of this pad and crowds on to the ramus it will add to your difficulties. If the tray covers only the apex of the pad it will also increase your difficulties. We have two widths of the tray to consider, viz., the width over all from buccal margin to buccal margin and the widths between the lingual margins. The buccal to

buccal width should not be great enough to interfere with the easy seating of the tray. The lingual width is the most important of the two and should be such as to give a thickness of one-eighth inch of compound at the extreme distal end of the lingual. Do not confuse this with the upper impression where one-fourth inch thickness is specified. Any greater or lesser bulk of compound here will result in unnecessary trouble. The last and one of the most important points for consideration is the trimming of the distal end of the lingual flange. This should be cut with shears so as to give a straight and oblique line to the distal end of the lingual flange, this diagonal line forming an angle of about forty-five degrees to the occlusal. Fig. 26D. The length of the tray should be such now that this diagonal line lies just above the internal oblique line of the Retro-Molar Triangle. Note that this oblique line is found on the Bowen tray at a point where his hinge is attached. Fig. 27 will show how the operator's finger acts in lieu of this hinge.

Softening the Compound

As in the upper impression the compound must not be too soft. Failure to heed this warning will lead to plenty of trouble. The tendency is to have the compound too soft and then with light pressure the tray is carried too close to the tissues, resulting in a thin impression which leads to trouble. The compound should be stiffer than heavy putty. In fact, the compound should be stiff enough to require more than the average pressure in getting it to position. The compound is softened as in the upper impression and made into a roll and placed in the tray. Do not heat and stick to the tray but bend the excess over the edges as a means of attaching to the tray.

Use only enough compound to take an ordinary lower impression, as too great a volume will lead to trouble. The Lateral Throat Form areas are taken at a subsequent insertion. In carrying the tray to the mouth note the relationship between the distal ends of the tray and the ascending ramus and attempt to center the tray upon the ridge. If the compound is stiff and heavy you will be able to exert a more positive pressure in centering it upon the ridge. In forcing the tray with material to position remember that we wish to have one-eighth inch thickness of compound. The author does not chill this compound in the mouth as it is unnecessary. If the compound has been used as heavy as suggested it will be easy to remove it without distortion. It is placed in cold water as soon as taken from the mouth. After chilling, the entire surface of the impression may be heated with the blowpipe to a depth of one millimeter and tempered in water of 120 degrees Fahrenheit, after which it may be re-inserted and secure a more positive imprint of the ridge. Since the master impression is to be taken in a rebase, this is not absolutely necessary. The most important point for observation is to see that the compound is approximately one-eighth inch thick over the oblique lines at the distal. Be sure also to see that the compound dips low enough on the lingual in the bicuspid area. The most important point now for observation is to be certain that the compound is one-eighth inch thick over the oblique edge of the tray at the distal lingual.

We now heat a mass of compound about the size of the first joint of the index finger. Fig. 29, A. This should be heated in water until it is homogeneous, and rolled into a ball, after which one side is passed through the flame. The compound under the oblique edge of

the tray (Fig. 29, B B) is passed through the flame and this small mass is stuck on at this point. With the blow pipe we now heat the lingual margin as far forward as the biscuspid position and up to the crest of the ridge. Fig. 29C. This is now dipped in the tempering water and the small mass is manipulated into an ideal form with the thumb and finger. Before inserting this, great care must be taken in testing the plasticity of this added mass. If this is too soft you are sure to have considerable trouble in getting it to position. If it is too stiff, it will go to position without serious trouble but the tissues are sure to be over-compressed. Long experience has enabled the author to give a positive and dependable rule for testing this plasticity. The rule is as follows: After the heating and manipulation is complete hold the impression so that this lingual surface with its added mass is in the horizontal position. This compound must be stiff enough to almost hold this position. If gravity causes this mass to suddenly drop it is either too soft or too thin over the internal oblique line. It may be either or both of these. It cannot be too strongly stressed that this test must be rigidly followed. The impression is now carried to the mouth by inserting at the opposite corner of the mouth from the side being taken. As the impression passes across the top of the tongue this soft mass will drag along the tongue surface and as the main body of the impression is seated upon the ridge the soft mass will not catch upon the ridge to be doubled back under the impression.

In most instances this softened mass will be doubled back toward the anterior. Be concerned first with the seating of the main portion of the impression and do not hurry unduly. When the impression is seated, pass the in-

dex fingers over the top of the impression at the first molar position with the thumbs under the lower border of the mandible and grip firmly. Now slide the index finger backward on the side being taken until the entire first joint is distal to the tray with the edge of the tray passing over the knuckle, Fig. 27. If the compound is too soft the finger will push through this compound and you will make a failure. If the compound is stiff enough it will have sufficient body that the entire mass will move as such into position in advance of the finger. Only about three pounds of pressure is necessary here. Remember that there is quite a space between this mucosa and the inner surface of the ramus. This lateral pressure must not be enough to interfere with the circulation. In the rebasing technic there is a step which checks this pressure accurately.

Make no attempt to place cold water in this part of the mouth. After waiting ten seconds and with the compound heated as per instructions the impression can be removed without distortion. It is now thoroughly chilled by dipping in cold water. With a sharp knife we trim the excess of compound that covers the oblique edge of the tray. With this oblique edge exposed we cut a small groove in the compound alongside this metal edge and break the flange away by grasping between the fingers and thumb and exerting a firm pressure toward the buccal. Fig. 29.

We now proceed to take the opposite side in the same manner except that we do not break away this second flange. The broken flange is now attached with sticky wax and we are ready to pour the cast.

Pouring the Cast

Since the denture is not to be finished upon the cast

taken from this impression, it may be poured in any good cast plaster. After filling the ridge portion of the impression, pour the plaster out upon a glass slab or waxed paper. (The author uses a sheet of celluloid.) This plaster should now be stiff enough to support the impression, which is inverted upon this mass and the excess pulled in so as to reinforce the cast especially at the distal.

Designing the Trial Plate

Too much emphasis cannot be placed upon the importance of this step. It is the keystone to the arch of success. Unless this trial or baseplate is correct in outline and thickness only failure can result. The designing of this baseplate is based upon nearly fifteen years of research in this particular phase of the work without an interruption or other work to distract the attention from the work in hand. More than one hundred heads have been dissected and more than two thousand cases have been built and checked as to results attained therein. Certain definite conclusions have been reached as a result of this research with especial reference to the Mandibular Denture outline form. In the past, we have been inclined to consider the floor of the mouth as a concavity. This might appear to be so until we consider these tissues in function. When these tissues are studied in their relaxed position they present quite a different appearance from that found when they are in function. There is in the mouth a denture space which is that space available for the accommodation of the denture while the tissues function in a normal way. After reading the chapter on Anatomy and then studying Fig. 14 one will be convinced of the harmony that exists when such a denture is built.

After carefully examining the cast before us we try to visualize the teeth as being in position. We locate the second bicuspid tooth and place a period under this position at the lowest point on the cast. Fig. 28A. This is the lowest point in the floor of the mouth that the tissues in function will permit a denture margin to be placed. After locating the second molar position we place a period under the distal cusp of this tooth on the "height of contour." Fig. 28B. A line drawn downward from this point to the periphery of the cast will be a convex line. The highest point on this convexity is the Mylo-Hyoid ridge and the period is placed here. These two periods are connected with a straight line which represents the Mylo-Hyoid ridge and is the attachment of this muscle, which is a border tissue to the lower denture. Fig. 28, A. B.; Fig. 14; 6. The anterior end of this line represents the point where the Mylo-Hyoid muscle drops to a lower level to pass under the sublingual glands and therefore the denture margin from this point forward passes upward and forward to avoid impingement upon these glands. Fig. 14; 4. These two periods are made upon the opposite side of the cast and connected with a straight line. The anterior ends of these lines are connected by lines that pass upward and forward for the reason just given. The marking of the buccal periphery is similar to old practices, the external oblique ridge being the guide. However, a reference to Fig. 16C will show a common error. The buccinator muscle is the buccal border tissue to the denture and the contact between the two should be maintained throughout this buccal insertion. As this buccal insertion passes back in a curved line until it reaches the Pterygo-Mandibular Raphe, the denture margin should follow this

line as shown at Fig. 16B. This raphe is inserted into the base of the Retro-Molar pad and this pad should therefore be almost entirely covered by the denture. The dotted line—Fig. 16C shows the common error of crossing the ridge at the apex of the pad and thus making the denture too short and missing a chance for a peripheral seal. The end of this buccal line is connected with the end of the lingual line by describing a half circle. Fig.

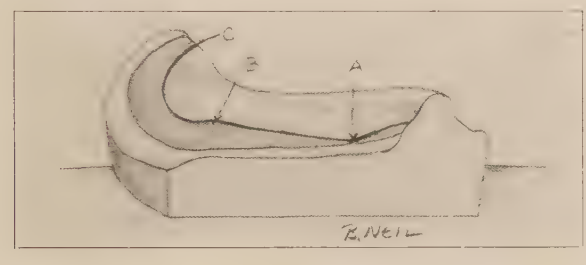

Fig. 28.

28, BC; Fig. 14, 8. The labial margin is made on a basis of the border tissue attachments as found at the chair. There is one thing that is absolutely certain about this design, and that is that it is in harmony with the anatomical requirements of the case as to outline form for the average case. This design is made with the thought that it presents an over-extension. These over-extended margins will be checked directly to the functional requirements of the case in hand. With a pointed instrument we cut a shallow groove throughout the entire extent of this outline. This is for the purpose of giving the technician a definite rule for trimming the baseplate when it is taken from the vulcanizer. This cast is sent to the technician who produces for us a vulcanite base. This baseplate must present a lingual periphery throughout that is one-eighth

of an inch thick. There is an occasional case where this thickness is not necessary but it is best to follow this as routine practice. The thickness over the crest of the ridge may be reduced to facilitate the setting up of the teeth.

Checking the baseplate to the functional requirements of the border tissues is the next step which must be carefully done. The buccal and labial margins are divided into five sections for consideration, viz., that section of

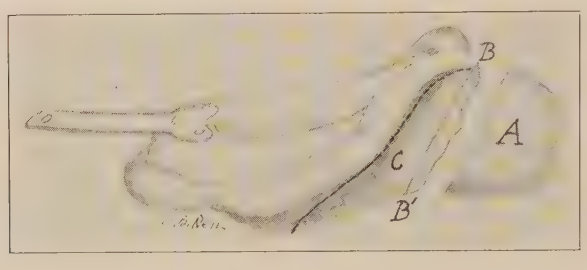

FIG. 29.

the buccal margin distal to the buccal fraenum; the buccal fraenum; the same sections on the opposite side, and the labial section between the two buccal fraena.

Place the index finger inside the mouth and opposite the mloars with the thumb opposite and on the cheek. Lift these tissues to their highest position and seat the trial plate with the index finger of the opposite hand carrying it repeatedly to place. If the trial plate is overextended in this section, a distinct tug on the tissues will be noticed. The margin here is shortened a bit and the section again rechecked. The index finger and thumb now grasp the buccal fraenum and check it in the same manner. The two sections of the opposite side are checked in the same way, as is also the labial section. There should be no noticeable tug upon the tissues as the

trial plate is seated with the possible exception of the case presenting a low tissue tone.

Since the tongue in function controls and determines the function of the floor of the mouth and the lateral throat form, we have the patient protrude the tongue as far as is possible with the baseplate being held firmly in position by the operator. The greatest anterior position of the average tongue is one-fourth inch anterior to the red line of the lip. (See chapter on classification.) If the tongue cannot be protruded to this position it will be because the lingual margin of the trial plate is at some point over-extended. The patient alone can locate this point of over-extension. We have them repeat this tongue action several times and note if they feel this interference in the front of the mouth or the back of the mouth. We use these terms that the patient can understand. We are really asking them to note if the lingual fraenum or the lateral throat form is being interfered with. If the interference is in the anterior, we know that the fraenum is being interfered with and the margin is shortened here. This test is again applied and we note if the interference has now shifted to the distal of the mouth. It is well to ask the patient if there is a difference in the interference in the two sides. Please note that this is not a question of whether or not these tissues will lift the baseplate. This would occur even though the margins were too short because of a lack of adaptation. The question is—Can this tongue and the floor of the mouth move to their functional position without discomfort to the patient? The ideal condition which we are striving to attain is to have these tissues function in comfort with an equalized tension upon them at all points. As these lingual margins are shortened, the operator should watch

the tongue and it will be noticed that it continues to come farther over the lip as the margin is trimmed. After the tongue reaches its functional position, a continued trimming of the lingual margins will invite trouble. Too short a margin between the bicuspids is a common cause for failure to procure a peripheral seal. In trimming this periphery care must be taken not to destroy this "Ideal Anatomical Form."

When we are sure that the margins are properly checked, we are ready to build our occlusal rim and proceed to the recording of centric relation and the setting up of the teeth.

CHAPTER V

Rebasing the Full Lower Denture

Many men are at a loss to know why they secure such poor retention in their full lower cases. There are several conditions that contribute to the fact that retention in the full lower case is not so good as in the upper. With a case presenting ideal conditions it is not possible to secure the same degree of retention in the full lower as in the full upper. The border tissues of the lower denture, especially the lingual tissues, do not drape over the denture margin as definitely as they do in the upper. The extreme mobility of the tongue and its influence over the lingual border tissues of the lower denture gives greater chance to break the seal and dislodge the denture than is found in the upper. The total periphery length in the lower being so much greater than in the upper, offers a greater chance for a break in the seal. The gross mandibular area being less than the gross maxillary area offers less chance for stability through adhesion. In the gross mandibular area there are a greater number of lesser areas incapable of withstanding stress than is found in the maxillary area and this contributes to a poorer retention. In view of the above facts, it behooves one to take advantage of every possible factor that will contribute to an improved retention. There are three of these major factors, viz., a perfectly balanced occlusion; a perfect peripheral seal, and an adaptation between denture base and all available stress-bearing surfaces, such adaptation being in harmony with the resiliency of said areas and in harmony with muscle pull. The correct designing of the baseplate was the first step toward securing this peripheral seal, which is perfected

in the rebasing process as we have these border tissues function with moldable compound over these margins. Having balanced the occlusion, the adaptation between denture base and tissue is procured by the muscles as they function to bring the teeth into centric relation, with moldable compound properly placed upon the denture base. The stress-bearing areas under the lower denture bear a much smaller ratio to the gross area than is the case in the upper. There are four non-stress-bearing areas in the lower denture as against one in the upper. Unless provision is made in the fitting of the case to relieve these areas as the stress-bearing areas are functioning, no comfort can result. It is only the extremely favorable ridge conditions that any degree of retention and comfort can be attained for the patient with any impression that is secured prior to the arrangement and occlusion of the teeth. However, after the teeth have been articulated and this articulation has been proven and balanced, one can secure a master impression in the form of a rebase with compound and secure a much greater degree of retention and comfort for the patient. The reason for this is that the occlusion having been perfected and the teeth brought into function by the muscles, with the compound properly manipulated under the mandibular base, the tissues are made to function under muscle pull and therefore subjected to the same stress as in mastication with the finished case. The ability of the operator to use the physical properties of modeling compound in a building-up process makes it possible for him to consider these several areas separately, completing them serially and thus giving each separate consideration. By this method alone can the author

give his patients the maximum of retention and comfort in the average full lower case.

Comparatively few men have understood the anatomy of the mandibular area and the functional requirements of these tissues to attain the results that were possible in a given case. To attain the most perfect results possible with a lower denture it is necessary first to understand thoroughly the functional requirements of all of the border tissues to this denture and then build the margins of the denture to these requirements. This denture thus far has been built upon a trial plate, the outline form of which was designed with years of research and clinical experience as a background. This baseplate was checked to the functional requirements of the border tissues by having these tissues actually function around these margins. This check-up will be repeated and then, with compound upon these margins, these border tissues will again function to form these margins under actual functional conditions. The operator must remember also that the gross area under the denture will be divided up into lesser areas according to the degree of resiliency of these lesser areas and then subjected to a stress which will be relative to their resiliency and this stress to be applied by the muscles themselves as the teeth function in occlusion.

The first prerequisite to success in a rebase is a balanced centric relation. If the dentures are inserted and brought into centric relation, any cusp interference will cause the dentures to tilt or slip on the tissues into an improved cusp relation which will be misleading as the dentures have changed their positions upon the tissues. Too many men have passed upon an occlusion by just having the patient bring the teeth into contact. There can be no accuracy in such a procedure. It is necessary that we

use a soft wax between the occlusal surfaces of the teeth and have the patient close just hard enough to give a cusp imprint in the wax without cutting through at any point. If any cusp penetrates entirely this wax, it will be a worthless record. With this record, the case is transferred to a precision articulator and the cusp interference is removed. When the case is returned to the mouth it is well to have the patient close in centric with a gentle pressure and ask them to cease pressure when they feel the first cusp contact. The patient is then told to apply more pressure while the operator watches to see if there is any shifting of the dentures. The patient is also told to notice if through their tactile sense, all cusps seem to strike at the same time. This latter method should not be used until after the gross cusp interference has been removed by the check-bite and articulator mounting.

The second prerequisite to success is to again check all margins of the denture base to the functional requirements of the border tissues. This was done with the baseplate but should be repeated now as a further precaution against error at this point. The teeth are now in position and as the tongue is protruded as in moistening the lips, it is functioning under more nearly normal conditions than when the baseplate alone was in position.

The third prerequisite is to check the pressure against the lateral throat form tissues. This is done by applying pressure to the lower incisors in an effort to tilt the denture upward at the distal. This check-up is only made in Classes 1 and 2 lateral throat forms, as the Class 3 does not have this area available. When this check-up is made the cheek should be drawn aside to purposely break the seal, which is sometimes present and would be misleading, as we are trying to determine if there is too much of a mechanical anchorage. If this denture is so

thoroughly anchored that there is no appreciable upward movement of the distal, the lateral pressure here is too great and the inner surfaces of these flanges, Fig. 31C, should be relieved by scraping. This is again tested and further relieved until the denture will lift at the distal at least two millimeters.

With a number six round bur we cut a diagonal groove just anterior to the throat form area and just over the internal oblique line of the Retro-Molar triangle.

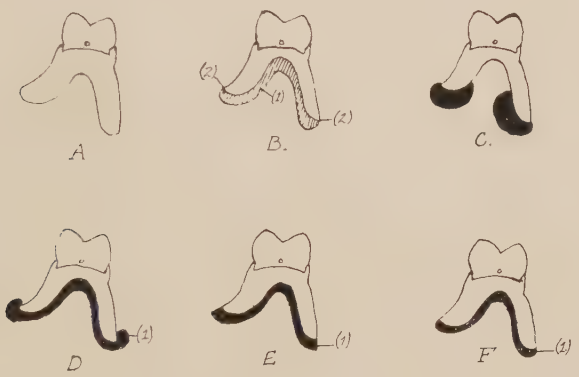

FIG. 30.

Fig. 31AA. This oblique line is in the depth of the undercut and is in approximately the same position as the oblique edge of the tray. The purpose of this groove is to facilitate the separation of the flask. This groove is cut to a depth equal to one-third the thickness of the flange and is made on both the right and the left side of the denture. The position of this groove is indicated by a scratched line which is placed over the groove on the lingual side. Fig. 31, DD.

Fig. 30A represents a cross-section of the denture before preparation for the compound.

With vulcanite burs we now cut vulcanite from the

entire inner surface of the dentures with the exception of those surfaces distal to these grooves. Fig. 31C. This vulcanite is removed to a depth of about one millimeter and increased to two or more at the margins so as to produce a bevel as shown in Fig. 30B2. It is not so important that we remove any definite amount of vulcanite as it is that we remove a uniform amount throughout the denture base with the exceptions noted. An additional millimeter is removed from the surface over the crest of the ridge.

We are now ready to begin the manipulation of the compound and the author is using Kerr's Red Sticks. This compound is traced just inside and upon the entire buccal periphery and upon the lingual periphery anterior to the grooves. Fig. 30C. No compound is placed upon the flanges at this time. The size of this roll of compound is, of course, relative to the width of the denture base and no compound is placed upon the crest of the ridge. The ideal amount would be a sufficient quantity to flow across and produce a complete imprint of the ridge and at the same time leave an excess over the margins of about one-eighth inch in thickness. Fig. 30D1. This excess upon the margins is for the purpose of a tissue trim here by the border tissues. After the compound is properly traced over these margins the alcohol flame is played over the compound until it reaches the flowing stage. It is then dipped into the tempering water for five to ten seconds which brings it from the flowing to the moldable stage and then carried to position on the ridge. The operator should use a slight finger pressure to start the denture to position and then have the patient bring the teeth into centric relation and instruct the patient to close with very heavy pressure. This pressure must not

be maintained longer than is necessary to cause the compound to flow across and unite at the ridge crest. Fig. 30E. To continue the pressure after it has united, is to increase the pressure upon the crest of the ridge, which is not to be desired. The denture is removed and immediately placed in cold water. When one has the compound under control, properly heated and properly tempered, it will not be necessary to chill in the mouth.

We now examine for defects in the form of wrinkles and holes. These may be due to a failure of the patient to apply sufficient pressure or may be due to an insufficient volume of compound. An examination at the distal edge of the compound or around the edge of a hole will reveal whether or not there is a deficiency. If the compound is very thick it may be that the patient did not close with sufficient pressure.

The most disastrous error here is to have the compound pressed out to too thin a mass and this is usually due to having the compound improperly tempered. The tempering water must not be warmer than 120 degrees Fahrenheit and should be preferably 115 degrees Fahrenheit. If the compound is pressed out too thin at the first closure, it will be found that the subsequent closures will increase the thinness to a point where there can be no equalization of pressure upon the tissues and the rebase will be no better than an ordinary impression. In fact, it would not be as good as certain areas would be tremendously overloaded. The reader should gather from this discussion that it is of paramount importance that we have a definite cushion of compound under the denture base of such a thickness as to insure a balanced tension of the tissues. This also stresses the importance of removing a uniform amount of vulcanite before be-

ginning the rebase. Therefore, if it is found that the compound over the denture base is less than two millimeters thick, it should be removed and the step repeated. If there are holes through the compound and we have a sufficient volume, these holes may be filled by adding compound, re-heating, re-tempering and re-seating under heavy centric relation. When a defect is being corrected in the seating area of a rebase, the entire seating area must be reheated. To heat one side and leave the other side cold would result in failure. The next step is to recheck the centric and see that we have not lost centric relation in this step of establishing the initial imprint of the ridge. Insert the dentures and study the occlusion carefully as the patient gently closes repeatedly. If this centric relation has been disturbed, this step must be repeated until same has been corrected. When we are satisfied with the imprint of the ridge, we turn our attention to the buccal and labial periphery. If there are places on this periphery where we do not have a full one-eighth inch of excess, compound is added to these places and the case inserted so as to distribute this freshly-added material. We now trim away the known excess from the buccal margin, using a sharp knife and holding same with the blade practically parallel with this surface. See Fig. 30 E (1).

With the alcohol flame we now heat this entire buccal and labial margin of compound, bringing same to the flowing stage. We now dip the denture in the tempering water and hold long enough to bring this compound back to the moldable stage. The case is inserted and the patient instructed to bring the teeth into heavy centric relation and manipulate the lips as in whistling and laughing. If the heavy centric pressure is not

maintained while this step is carried out it will result in a false margin. Remove and chill thoroughly and examine for results. Where there is an excess it will be pulled out and over the vulcanite margin. This is trimmed away with the knife and the margin re-heated and re-trimmed. This is repeated until there is no excess. Fig. 30F (1). If the border tissue should displace the compound until there is less than one millimeter of thickness it indicates an over-extension and the compound should be cut away and the vulcanite margin reduced.

We now turn our attention to the lingual margin. If there is any point on this margin where we do not have a full eighth inch of excess it must be added and the denture inserted under pressure to distribute this excess, after which the case is chilled. This known excess upon the lingual is trimmed away with a sharp knife as on the labial and buccal margins. This lingual margin is heated with the alcohol flame and dipped in the tempering water until the compound is brought to the moldable stage. The case is now inserted and held firmly in position by the operator's fingers and the patient instructed to protrude the tongue as far as is possible. This will be to a position previously determined by the operator as being the extreme anterior position in function. Remove and chill and then examine for results. If the lingual tissues have displaced the compound to a thickness less than one millimeter, we may have an over-extended margin. This is likely to happen at the median line. Cut away the compound and reduce the vulcanite margin and repeat the step. We now trim away any excess that has turned over the margin and repeat the step. This step only involves the lingual margin anterior to the second bicuspids.

We now turn our attention to the non-stress-bearing areas upon the hard lingual surfaces of the ridge in the molar area. See Fig. 31ED. Fig. 31 will show the thickness of the compound at line A, B, all compound having been cut away from the surface distal to this line. Within this surface there are three sub areas, viz., C, D, and E. Area C is the inner surface of the Lateral Throat Form flange. No vulcanite is ever removed from this surface preparatory to rebasing except when too much

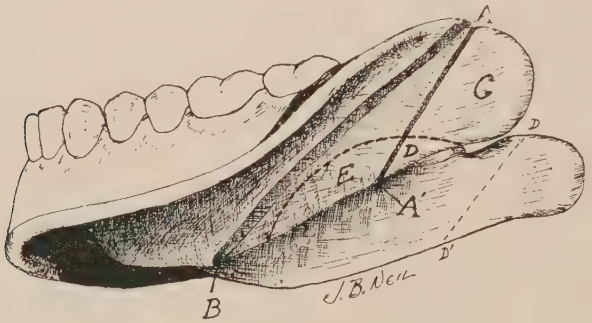

FIG. 31.

A, A, Groove cut partially through vulcanite in depth of undercut anterior to Lateral Throat Form flange; Line A-B, Compound margin showing exposed vulcanite over non-stress-bearing area; ED. C, Inner surface of Lateral Throat Form Flange; DD, Mark superimposed over groove AA; E, Non-stressbearing area; D, Margin over which the high fibres of Mylo-Hyoid function.

pressure was procured here in the primary impression. Area E is a non-stress-bearing area, functioning as it does in contact with the hard lingual surface of the mandible. This area sometimes presents a bony spine (the Mylo-Hyoid Spine) covered with a very thin mucosa. Fig. D is the area in contact with which the last fibres of the Mylo-Hyoid muscle function at their highest position and this is considered with area E in cutting out an additional amount of vulcanite for a relief, thus giving these fibres at this point a greater freedom of movement. The compound is cut away from the lingual margin on

both sides distal to the second bicuspids and up as high as the crest of the ridge, exposing the vulcanite over these areas. With a vulcanite bur we cut away an additional millimeter of vulcanite over the areas. E. D. If the denture was now inserted it will be noted that there is no contact here ever under heavy centric pressure. The object of this step is to remove the pressure from these areas. These areas are handled separately, one side being finished before considering the other. It makes very little difference which side is handled first. If there is a difference in the depth of undercut in the two sides, the side having the deepest undercut should be handled first. Compound is now applied to the side having the deepest undercut, covering all exposed surfaces of vulcanite including the entire throat form areas. The alcohol flame is now played over this compound, also heating the edge of the cold compound so as to cause the two to blend together. We dip the case in the tempering water and carry to place, holding firmly with finger pressure while the patient protrudes the tongue as far as possible. The case is removed and chilled. We now remove the excess, using a sharp knife in the same manner used in trimming excess from other margins. This margin is again heated with the alcohol flame, tempered and re-inserted while the tongue is protruded. This is continued until there is no excess. If the thickness of compound around this margin is one millimeter or less, it is advisable to shorten the vulcanite at this point. The opposite side is finished in the same manner.

With a new round number ten or eleven bur we remove compound from the crest of the ridge between

the anterior edges of the Retro-Molar pads. If the compound is thoroughly chilled and slight pressure applied to the bur, it will cut this satisfactorily. We now dip the denture in a basin of water heated to 130 degrees Fahrenheit and hold for about ten seconds. The case is carried to the mouth and the patient instructed to close in heavy centric and then to swallow. The case is then chilled while this pressure is maintained. The case is now tested for retention and if this is poorer than should be expected with the conditions present, it will usually be the result of an imperfect adaptation. Look for wrinkles and correct same by re-heating. This re-heating with the flame after the case is supposed to be finished is dangerous as we are likely to destroy the tissue balance by forcing the compound to too great a thinness.

If the retention is satisfactory, the last step is to test the muscles in swallowing. Give the patient a glass of water and have him swallow and note if there is an interference in this act. If there is a slight over-extension at the distal, the patient will experience an awkwardness in bringing the muscles into correct position. With the compound thoroughly chilled these edges may be scraped with a sharp knife from the crest of the ridge around to the second bicuspid position. These edges may be heated with the flame and tempered, after which the patient is allowed to function the tongue in protrusion. Test again with the water in swallowing.

The case is now carefully boxed and a cast poured of some dependable cast material. After this cast has thoroughly set, the box is removed. We now have the diagonal scratched lines superimposed above the grooves made with the number six bur. With a bur of the same size we cut through these lines until we completely sever

these vulcanite flanges. These are not removed until after the flask is opened for packing. The grooves are filled with wax and the case is flasked as any ordinary case.

Fig. 32 shows the finished lower case. Note that the margin A to B is the arc of a circle. The margin B to C is a straight line to harmonize with the insertion with the Mylo-Hyoid muscle as shown in Fig. 14, (6). Note that the lingual margin just below the second molar

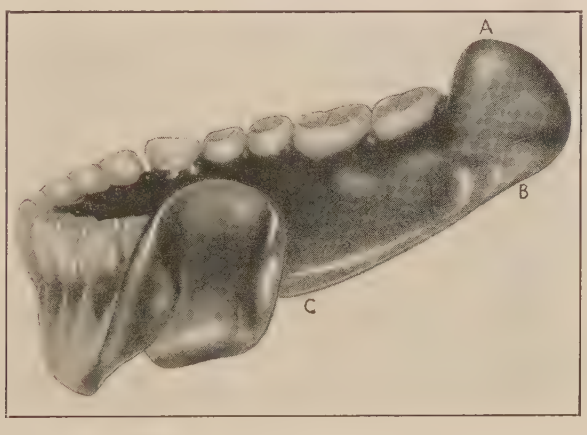

FIG. 32.
Finished Lower Case.

presents a slight anterior-posterior concavity to accommodate the high insertion of the most distal fibres of the Mylo-Hyoid muscle. Note that the point C on the lingual margin is the lowest point on this margin and functions just distal to the sublingual glands as shows at 4 in Fig. 14. Note the thickness of the margin of the Lateral Throat Form as shown on the left side of the denture Fig. 32. Note also the high polish given these margins. When this high polish is broken in making

an adjustment, it should be restored before the denture is again worn.

Deviations from this Technic for Abnormal Conditions

In cases of extreme absorption it is sometimes found that the seating area of the denture in the second molar area is at or below the insertion of the Mylo-Hyoid muscle. Fig. 2, B. In such cases it will be found that the internal oblique line of the Retro-Molar triangle is now continuous with the Mylo-Hyoid ridge and presenting a sharp edge of bone. This sharp edge of bone has been termed by the author as the Mylo-Hyoid Spine and should be rounded surgically whenever possible. It is that portion of the sharp bone distal to the last fibres of the Mylo-Hyoid muscle. Distal to this sharp Mylo-Hyoid Spine we have the Lateral Throat Form area, Fig. 31C, and it is a fact that in many of these cases of extreme absorption of the ridge this area is large and favorable for the extension of the denture area. It is impossible to use this area without carrying the lingual denture margin across this sharp Mylo-Hyoid Spine. If this is done without any special provision for the relief of this point, the lateral movement of the denture will traumatize this tissue and result in persistent soreness. Anticipating this trouble the denture margin at this point should have been made extra thick (a full one-eighth inch after polishing). This additional thickness will allow for the cutting out of more than the usual amount of vulcanite over the non-stress-bearing area E in Fig. 31, preparatory to the rebase and therefore allowing for an additional and expected lateral movement. Both sides are prepared and the compound is added to both sides, leaving the actual throat form surfaces exposed.

The compound upon both sides is heated with the flame and tempered. The case is now inserted under heavy finger pressure and while maintaining this pressure we pull the denture from side to side and thus secure an impression of these spines with the denture in an extreme state of tortion. This movement may be made by the patient with the teeth in occlusion, but the experience of the author has been that because of the accompanying discomfort, the patient will not produce this movement as vigorously as he should. The case is now chilled and the excess removed from the margins. These margins alone are heated and tempered and the case inserted. The operator now holds the case firmly and the patient is instructed to protrude the tongue and thus have the Mylo-Hyoid muscle turn this excess at the margin up in harmony with its functional requirements.

The inner surfaces of the throat form flanges and their margins are now finished as in the routine technic. Even when we take these precautions it will be found necessary to make an additional relief here in the finished case by cutting away vulcanite with small mounted stones.

Another abnormal condition found in the mandibular ridge that demands especial attention is the ridge that is very flat in the anterior and showing great absorption. Here we sometimes find the Genial Tubercles protruding above the level of the possible seating area. This is due to the fact that the bone at this point is so much denser than the alveolar process. These points at the median line, will sometimes protrude as much as five or six millimeters above the level of the seating area, having the lingual fraenum attached at this point of bone. The bony surface below and labial to this point is very

dense, smooth and convex laterally. It must be considered as a non-stress-bearing area and provision made for its relief. There is another condition that may or may not accompany the presence of this spine and that is a ledge of bone on both sides of the median line, occupying the approximate horizontal plane and extending inward for about three millimeters. The flexible mucous fold which constitutes the floor of the mouth functions actively from the lingual edge of this ledge. The surface of this ledge is very dense and must be considered as a non-stress-bearing area. Clinical experience teaches us that we must follow a definite technic here if we are to secure the best possible results. The best results possible here will fall short of what we would like to accomplish. At the time we design the trial plate upon the primary cast we must be very careful to have the lingual edge of the base extend beyond the lingual edge of this ledge. This extension must be sufficient to carry the lingual margin at least two millimeters over and onto the flexible mucosa. This is for the purpose of enabling us to cut a relief over this ledge without at the same time disturbing the lingual periphery.

After we have formed the first definite and corrected imprint of this entire ridge in the rebase with compound, and have checked the centric cusp relation to see that it has not been lost, we should remove all compound from over this hard, bony ledge upon both sides of the median line. After this compound has been cut away to expose the vulcanite of this surface, we must cut away at least two millimeters of vulcanite from this surface. With the remaining surface of the compound chilled, we now cover this surface of the denture which is exposed, with compound which is tempered and carried to position. The patient closes the teeth into very heavy centric and

we thus secure an impression of this ledge with the tissues of the seating area under stress as in mastication. The margins are now finished as in the routine technic, being careful to see that these lingual margins are resting upon this lingual flexible mucosa. To have the denture base so narrow here as to cause the margin to rest upon these ledges is to certainly invite failure in that there will be present here a constant tendency to traumatize these very dense tissues. Even after the denture has been finished it will be found necessary to make a further relief over these ledges. If the margin at this point is resting upon the mucous fold, this relief may be further increased with finishing burs or mounted stones without cutting the margin, and thus preserve whatever degree of peripheral seal it has been possible to secure.

There is another deviation from the normal which demands especial attention and that is in the case of the extremely absorbed ridges we will sometimes find a hard nodule on both sides of the median line and labial to the cuspid position. These are symmetrical in outline and present a low convex surface eight or ten millimeters in diameter. They are very dense and provision must be made for their relief in the finished case. Just distal to these and situated labially from the second bicuspid positions are the mental foramina. When the absorption is very great these may be found under the denture base and a relief must be made here to avoid impingement upon these nerves. This impingement, if allowed to persist, will result in an itching and burning sensation in the lower lip at the corner of the mouth on the affected side.

CHAPTER VI

Delivering and Adjusting the Case

Every denture should receive definite attention for a period of time after it is delivered to the patient, the extent of this period of time and the frequency of the adjustments varying. The statement has been made by some dentists to their patients: "I have made this case and it is now up to you to wear it." This is true with reservations. It is up to the patient to co-operate in the necessary adjustments being made by wearing the case as per the instructions from the dentist. There are times during the day or night when tissues require rest by removing the dentures for short periods. It is not up to the patient to persist in trying to wear a denture that has not been properly finished and serviced.

It is an act bordering on malpractice to deliver dentures to patients without first balancing the occlusion in these cases. Having balanced the occlusion, we are ready to let the patient begin the "breaking in process." Instead of encouraging the patient and leading them to believe that they will begin to masticate food from the first meal, they should be told that their first effort should be to educate the muscles to function under this new environment. The muscles in deglutition, the muscles and other tissues constituting the border tissues and the muscles of expression are now to function in a way that is foreign to them and to nature's plan. A very large foreign body has suddenly been thrust into the mouth and it should not be expected that all of these tissues will go on in their functional activities as before. Patients have been told that artificial teeth are to mastication what an artificial limb is to walking. This is an apt and fine il-

lustration. It is well to say to the patient that the breaking in of dentures is comparable to the ordeal of "learning to skate upon the ice or upon rollers." The expert skater has mastered a muscle co-ordination in function which has led to the maintenance of a perfectly balanced equilibrium. The muscles and ligaments involved in the wearing of new dentures function in the same awkward way as do the muscles involved in the ordeal of "learning to skate." The persistent philosophical mind will soon master either, while the other mental types will have their worries.

The patient should be told to go home and get a good book, and get off in a room to himself and begin to read aloud. Perfect enunciation with artificial dentures is hastened through practice and the amount of practice necessary is relative to the degree of harmony which exists between the denture margins and form to the functional requirements of the tissues involved.

When one has learned to enunciate clearly, mastication will follow with less embarrassment. The patient should be told not to expect perfect function in mastication for several days. Patients have been known to bring a big apple to the office when the dentures were to be delivered, this apple being sprung upon an unsuspecting dentist. They sometimes get away with it, but even in the most favorable mouth conditions accompanied by a philosophical mind, the act of eating an apple, is a severe test that would not be so severe a few days later. Most dentists make a practice of advising their patients to wear the dentures constantly, never removing them except for cleansing. This is good advice where one feels that the margins are not in absolute harmony with the border tissues, or where the adaptation to the tissues is

not the best, as the continued wearing of a case will to a degree improve the adaptation.

The author has made it a practice for years to instruct the patient to wear the dentures until retiring time and then remove them for the night. To cleanse and insert them upon arising in the morning and wear them until the time of the appointment, which is made for the following day. If there are minor impignements to be corrected, the best time to make such a correction is at the time of the appearance of the first sign of irritation, which is manifest in the form of an hyperemia. If the patient persists in wearing the dentures such a minor irritation may result in a serious inflammation which may necessitate the removal of the dentues for several days. The patient with the philosophical mind may go away and "fight it out" with such a condition, thus doing the dentist and himself an injustice.

Before closing this chapter definite instructions will be given for the relief of the tissues in the Lateral Throat Form Area. There is a very definite and positive difference in the function of these border tissues from that of other border tissues. It is possible for most patients to protrude the tongue to a point approaching the point of the chin. This tongue position would bring the lingual border tissues to a corresponding abnormal position. There is a very definite functional position for this tongue which is necessary, and that is to a point necessary to freely moisten the lips.

When the tongue functions to the position necessary to moisten the lips, the lingual border tissues and the lateral throat form tissues are at their extreme functioning positions. The denture margins are finished here, and these tissues are therefore subjected to tension every

time the tongue functions to this extreme position. The point is now made by some: If the denture is so accurately finished here, why should there by an irritation? The answer is: While we can finish the denture margin very accurately to this position, we cannot know exactly to what extent these tissues have been subjected to a state of tension. If there has been too much tension, which is likely to show up in the case presenting the high tissue tone, an irritation will result which must be relieved by scraping and buffing the edge of the denture. In making the relief at these margins, care should be exercised to preserve the original and ideal anatomical outline of the denture. This is done by scraping over a wide extent of the denture margin, removing the greatest amount at the point of greatest irritation. These margins must be buffed after scraping so as to leave a very highly polished surface.

One will do well to instruct the patient to return at the end of sixty days for the check-up on the occlusion. In a series of several hundred cases that were carefully balanced before delivery, a check-up at the end of sixty days found almost one hundred per cent of them in a state of malocclusion. This malocclusion was upon the anterior teeth which was the result of the displacement of tissues under the posterior teeth brought about by the increased pressure upon these areas.

When these cases are mounted upon a precision instrument and balanced, this balance will be fairly well maintained for a period of one year, at which time the occlusion should be re-balanced. In the average case it will be found that the patient should have new dentures at the end of five years, as repeated settling and re-balancing will have closed the bite to such an extent as to seriously interfere with function and facial contour.

THE BRIDGE BUILDER

An old man going a lone highway,
Came at the evening cold and gray

To a chasm vast and deep and wide
Through which was flowing a sullen tide.

The old man crossed in the twilight dim,
That sullen stream had no fears for him;

But he turned when safe on the other side
And built a bridge to span the tide.

"Old man," said a fellow pilgrim near,
"You are wasting strength with building here;

Your journey will end with the ending day,
You never again will pass this way:

You have crossed the chasm deep and wide,
Why build you the bridge on the other side?"

The builder lifted his old gray head;
"Good friend, in the path I have come," he said,

"There followeth after me a youth
Whose heart is brave with the love of truth.

This chasm that has been naught to me,
To that fair-haired youth may a pitfall be.

He, too, must cross in the twilight dim;
Good friend, I am building this bridge for him."

WILL ALLEN DROMGOOLE,
in "Rare Old Chums."
(R. L. Page & Co., Boston).

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